



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

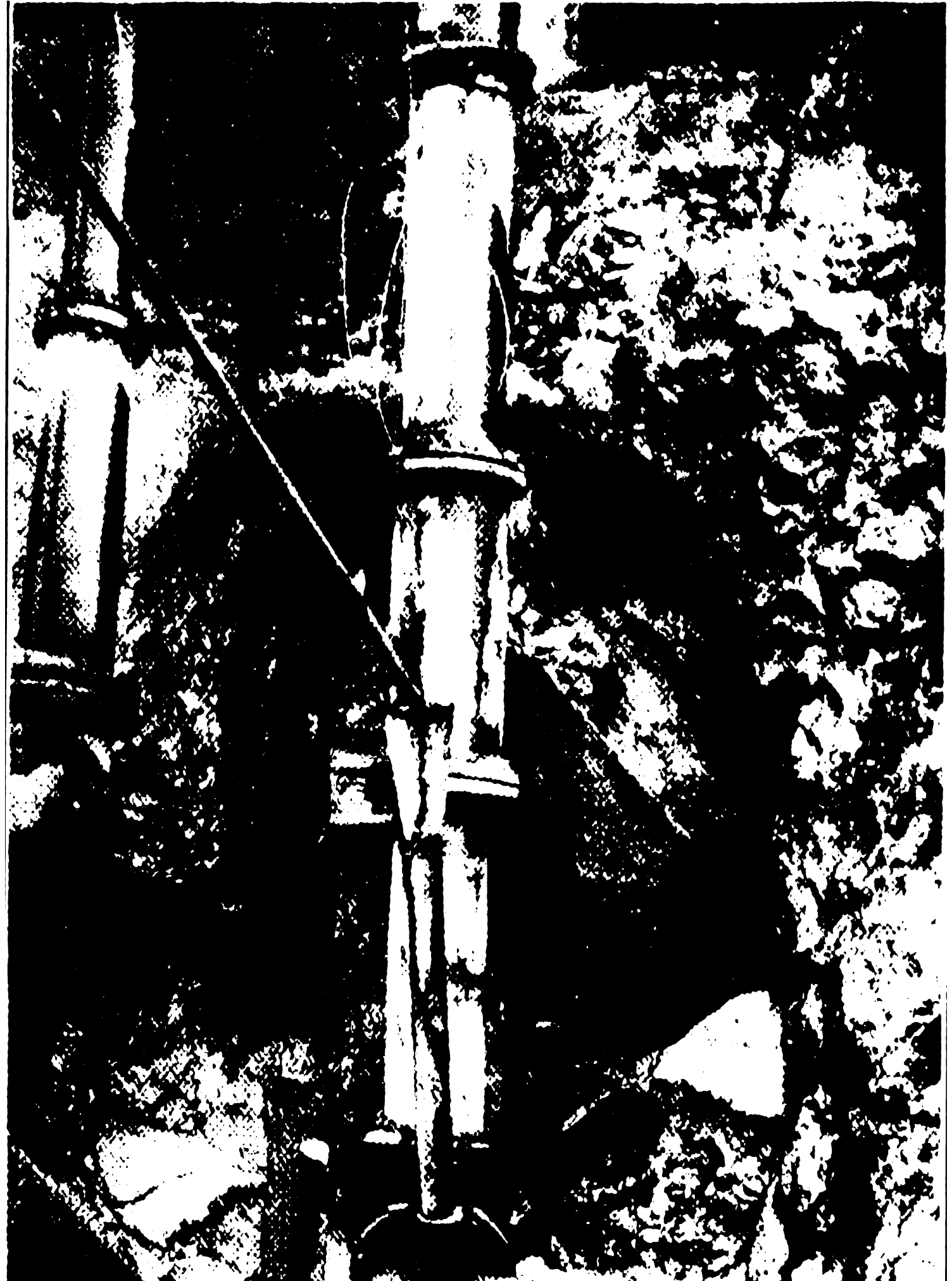
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



# *Mines Statement*

New Zealand. Mines Dept

A 622.0693  
N532



PRESENTED BY THOMAS WELTON STANFORD

**Branner Earth Sciences Library**







10

20

NEW ZEALAND.

---

# PAPERS AND REPORTS

RELATING TO

# MINERALS AND MINING

COMPRISING

STATEMENT BY THE MINISTER OF MINES.

REPORT ON THE GOLDFIELDS.

WARDENS' REPORTS.

REPORT ON COAL-MINES.

WATER-CONSERVATION.



WELLINGTON.

BY AUTHORITY: JOHN MACKAY, GOVERNMENT PRINTER.

---

1898.

Digitized by Google



1898.  
NEW ZEALAND.

---

# MINES STATEMENT.

BY HON. A. J. CADMAN, MINISTER OF MINES.

---

MR. SPEAKER,—

It is again my duty to place before you the statement showing the condition of the mining industry.

The impetus given to the industry through the investment of foreign capital has directed increased attention to mining pursuits. The large number of companies formed to prosecute gold-mining ventures, although now greatly reduced, owing chiefly to insufficient capital being subscribed, are in many instances carrying on works that must ultimately prove reproductive, and the mines which should become profitable concerns thereby increased.

In the Auckland District of the North Island prospecting work entailing the employment of numerous parties of men is now very much curtailed, and areas of mining land over which an option of purchase had been nominally secured on behalf of British investors are now thrown back on the hands of the original owners; in most cases, however, this has taken place in connection with land in which a fair and reasonable prospect of successful discoveries did not exist.

In the Middle Island, throughout the West Coast, Collingwood, Otago, and Southland Districts, many of the mining companies are carrying on extensive works in quartz as well as in alluvial mining, and, in the latter, more especially in dredging and the building of dredges.

I have endeavoured as far as possible to furnish the latest information procurable as to the position of the mining industry, but it will be found that the results set forth in the returns are in some instances supplemented by more recent information in the Statement itself.

## MINERAL PRODUCTION.

The quantity of gold, silver, coal, and other minerals, including kauri-gum, produced for the year ending the 31st December last will be found in Table No. 1., annexed. The total production of gold and silver was 435,537 oz., representing a value of £1,001,076, compared with a value of £1,052,017 for the preceding year. This shows a decrease of £50,941.

Of other minerals, including coal, 849,105 tons were produced, representing a value of £856,517, as against 800,205 tons, of a value of £862,224, for the previous year—the decrease in the value for this year being in a great measure due to the less value of the mixed minerals as declared to the Customs. The production of kauri-gum was 6,641 tons, valued at £398,010, as compared with 7,126 tons, valued at £431,323, for 1896.

The quantities and values of the chief mineral productions for the year ending 31st December last were as follow:—

1—C. 2.

83849

Product.	Quantity.	Value. £
Gold ... ..	251,645 oz.	980,204
Silver ... ..	183,892 "	20,872
Antimony-ore ... ..	10 tons	157
Copper-ore ... ..	...	2
Manganese-ore ... ..	180 "	541
Mixed minerals ... ..	1,561 "	5,892
Colonial coal exported, including that used by Home steamers ... ..	76,073 "	69,595
Coke exported ... ..	...	...
Colonial coal consumed in New Zealand ... ..	764,640 "	382,320
Kauri-gum ... ..	6,641 "	398,010
Total value of production for 1897 ... ..	...	1,857,593
" " 1896 ... ..	...	1,914,241
Total decrease ... ..	...	<u>£56,648</u>

The total value of the gold, silver, coal, and other minerals, including kauri-gum, exported up to the end of 1897 was £68,617,177.

#### GOLD-MINING.

The works connected with the production of gold, on which large sums of money have been expended by companies, are, in many instances, unfinished, or only so lately completed that returns from the mines have not yet made any material addition to the yields from the quartz-mines in both islands.

The unfinished state of some of the works in connection with hydraulic sluicing, and the scarcity of water consequent on the exceptionally dry season in Otago, will, in a great measure, account for the shrinkage in the yield from this source.

As a result of the plants already in operation the yield from many of the mines and claims has been augmented; and with the additional appliances contemplated the returns of gold and silver will in future, it may reasonably be anticipated, be not only maintained but considerably increased.

Many of the claims which have been taken up, especially for quartz-mining, were submitted to the public with glowing reports from so-called mining experts, with the result that the mining industry has been blamed for the misdirection and loss of capital. The chief cause of the disappointment, however, lies in the fact that too much credence was placed in the reports of inexperienced and unscrupulous persons.

Due regard for security of tenure has been shown in affording protection and concessions to claim-holders and companies who have given proof of their intention to carry on systematic operations, but the owners who have failed to do so have only themselves to blame if the land is thrown back into the goldfield for others to occupy.

The quantity of gold entered for exportation through the Customs for the year ending 31st March last, as shown in Table No. 2 annexed, was 251,492 oz., representing a value of £976,198; while the quantity exported for the same period of the preceding year was 256,913 oz., valued at £1,015,742. This shows a decrease of 5,421 oz., which has arisen in the mining districts of the Middle Island, the returns for the Auckland District showing an increase. Of the quantity exported, Auckland contributed 108,490 oz., Marlborough 619 oz., Nelson and West Coast 66,879 oz., and Otago 75,504 oz.

#### QUARTZ WORKINGS.

The yield of gold from this source compares favourably with last year's returns, although there has been in the North a falling-off from the mines at Coromandel and the Thames, made up, however, by a large increase from the Ohinemuri district.

The Reefton returns are only slightly less, whilst the returns from the Morning Star at Preservation Inlet, and from the Glenrock, show a decided increase in the yield for the Otago Mining District.

The adaptation of cyanide on improved principles will, in a marked degree, reduce the cost of extraction, and permit of an increase in the quantities of ore treated and an ultimate addition to the yield of gold. The returns from our quartz mines will probably, after the new plants are completed and kept steadily at work, reach if they do not exceed the yields maintained in former years. During last year 139,644 tons of quartz and tailings were treated in the Auckland District, yielding 321,664 oz. bullion, representing an estimated value of £405,745, as against bullion to the value of £354,256 for the former year, being an increase of £51,489. In the Nelson and West Coast Districts 19,742 tons of quartz were crushed for a return of 7,412 oz. of gold, valued approximately at £27,031.

#### COROMANDEL COUNTY.

The operations in the Hauraki Mine are still productive, although there is a considerable falling-off in the yield of gold. The Royal Oak Mine is again yielding very profitable returns, and steady yields continue from several other mines, notably the Tokatea Associated Reefs; and, with increased means of development, other older mines may again be expected to produce yields similar to past records. Many of the newer mines in the vicinity of the Kauri Block have yet to do a large amount of dead-work before they can become steady producers.

The Kapanga Mine, in which exploring operations at the deep levels are still being carried on, is being partly worked on tribute, and at least two of the parties so working have obtained handsome returns. In the other portions of the county operations in the mines are chiefly confined to preliminary work, and the returns show a falling-off, especially in the Kuaotunu district, where future success is dependent on the result of working at deeper levels. The Kauri Freehold Gold Estates Company is vigorously prosecuting prospecting works, and nine gold-bearing reefs are being developed. The total area held by this company is 36,000 acres, comprising twenty blocks of land, most of which are within the Coromandel County. The chief works are in the Opitonui Block, where two main shafts are in progress, equipped with steam winding- and pumping-plants. A new 40-stamp mill, provided with the latest appliances, and suitable for both amalgamation and cyanide processes, has been contracted for. A series of 2 ft. gauge tram-lines, nine miles in length, connect the mines with the battery and with the Whangapoua Wharf. As an indication of the extensive character of the various works which are being carried out, it may be stated that the expenditure of the company from April, 1897, to June, 1898, in wages alone, not including supplies and machinery, was £28,630 18s. 10d.

In this County 13,665 tons of quartz and tailings was treated during the year, yielding 27,427 oz., representing a value of £73,337. The number of miners who were employed in connection with the gold-producing mines was 741.

#### THAMES COUNTY.

The progressive works which have been carried on in this portion of the district have not yet reached the stage of development to admit of the chief mines again becoming producers to the extent of materially adding to the gold returns.

The low-level workings in the New Alburnia, Moanataiari, and Kuranui-Caledonian Mines have not been productive to the extent anticipated by the owners; and the valuable blocks of ground in the May Queen Mine must await drainage by the pumps at the Queen of Beauty shaft, as they cannot be operated on until the water has been lowered.

A further period must yet elapse before very large returns from any of the mines in this quarter can be expected.

During the past year, 20,850 tons of quartz were crushed and tailings treated, yielding 13,482 oz. of gold; representing an estimated value of £32,177. The number of miners in this district employed in gold-producing mines was 528.

#### OHINEMURI COUNTY.

The mines in this district have again given continuous returns of a most satisfactory character.



The Crown, New Zealand Talisman, and Woodstock Mines at Karangahake are now well opened up, and improvements in treatment and extraction have shown a marked increase in the yield of gold. The Waitekauri Company's Mine and the Komata Reefs Mine have both largely added to the year's return. At Waihi, the Waihi Company continue to furnish excellent returns, and, now that their new mill of one hundred stamps is working, future returns will largely exceed those of the past. The Waihi-Silverton Mine also continues to yield payable returns. The future prospects of this part of the mining district are of a most favourable nature.

During the past year 105,126 tons of quartz and tailings yielded 280,708 oz. of bullion, representing a value of £300,107. 1,480 men were employed in the gold producing mines.

#### PIAKO COUNTY.

The mines in this district have not yet arrived at the gold-producing stage. The low-level tunnel at Waiorongomai and the other workings by the Aroha Company have not furnished any quartz for treatment, and the thermo-hyperphoric process introduced by the Rev. Joseph Campbell has not yet been so perfected as to be in a condition to deal with the quantities of refractory ores for which it is specially intended.

#### TAURANGA COUNTY.

The quartz reefs in the Te Puke District are not yet developed, and gold-saving machinery has not yet been introduced for treatment of the ore.

#### WEST COAST DISTRICT.

Reefton, the chief quartz mining centre on the West Coast, has not produced any very rich yields. The Consolidated Goldfields of New Zealand (Limited) have, during the year, completed their new battery of forty stamps, and thoroughly developed their mines. A commencement has been made to crush quartz, and it is probable that the returns for next year will show a very large increase from this source.

The other mines are receiving attention, and at Paparoa Range the Croesus Company have erected a small battery to crush the quartz for their mine.

The developments at Victoria Range have not yet demonstrated a value in the reefs equal to the discovery of stone on the surface made in that district last year.

The quantity of quartz crushed during the year was 19,742 tons, for a yield of 7,412 oz. of gold, of the value of £27,031.

#### OTAGO AND SOUTHLAND.

The mines in which operations have been most successfully carried on are the Premier Mine at Macetown, the Achilles at Skipper's, the Cronwell at New Bendigo, and those mines situated at Carrick Ranges, Old Man Range, and McRae's Flat in the northern and central parts of Otago.

Prospecting is carried on, and mines are again being opened at Barewood, Waipori, and Table Hill, in the central and southern part of Otago. There is every reason to expect success will attend future developments. The Morning Star Mine at Preservation Inlet, in the extreme south-west of the island, has again yielded rich returns, and as a considerable number of claims have been taken up, prospecting operations may reveal fresh discoveries in the Southland District.

The quantity of quartz crushed during the year was 19,820 tons, for a yield of 17,302 oz. of gold, and a parcel of 288 tons of tailings treated for a yield valued at £1,610: making a total value of £69,510.

#### GENERAL.

In evidence of the continuance of rich yields of gold from quartz-mines, the returns from sixteen mines in the North Island show that 36,463 tons of quartz and 742 tons of tailings yielded 92,665 oz. of gold and bullion, of the value of £103,317; and seven quartz-mines in the Middle Island crushed 8,189 tons of quartz for a yield of 3,910 oz. of gold, valued at £14,728, during the months of

April and May last; while the returns received from twelve of the dredges at work in Otago show that 1,514 oz. of gold was obtained, valued at £5,900, during the same period.

It may be interesting to state that about three-fourths of the total value of the gold-yield in the North Island for the year ended the 31st March last has resulted from the use of the cyanide process, and for the months of April and May last, 87 per cent. of the value was from this process.

#### ALLUVIAL MINING.

The Middle Island is the chief seat of this branch of the industry, although there are also evidences of auriferous drifts and sands in Stewart Island, but these up to the present time have not proved of much importance.

In the North Island the gravel drifts have, so far as is known, proved barren of any precious metal; while in the Auckland quartz-mining district the free gold found in some of the creeks, being shed from the hill directly into the lower ground, differs from typical alluvial deposits.

#### MARLBOROUGH.

The chief gold-producing localities are at Wakamarina, Mahakipawa, and the range lying to the northward of the Wairau River. At each place a limited number of miners earn a livelihood by sluicing and washing the terraces.

#### NELSON.

At Collingwood the Parapara Hydraulic Sluicing Company has, under new management, secured good returns, and its prospects appear to be favourable. The Collingwood Goldfields (Limited) is actively engaged in preparatory operations, and it is anticipated that the company will be amongst the gold producers in the near future. The Anatoki and Bubu Districts, at Takaka, and the Wangapeka and Baton Rivers, in the Waimea County, still afford profitable employment for a number of parties of miners.

#### WEST COAST.

The great extent of country bounded on the west by the Tasman Sea, on the east by the Southern Alps, and extending from north of the Buller River to Jackson's Bay, constitutes the famous West Coast Goldfields, in which are worked the beds of the principal rivers and their tributaries, as also those vast deposits of gravel-drifts found in situations varying from below sea-level to altitudes of 4,000 ft.

The coast terraces to the north, and also to the south of the Buller River, have yielded rich returns in the past; all the branches and tributaries of this river to the source of the Owen River have also been more or less auriferous.

Operations are being successfully carried on at Waimangaroa, Addison's, Charleston, near the sea-coast, and at Fern Flat, Lyell.

#### *Grey Valley.*

The terraces in this district still continue to afford remunerative employment to a large number of miners, and, where the water-supply is plentiful, sluicing claims are to be worked on a large scale.

#### *Kumara and Waimea.*

The water-supply which is provided by the Government races has been augmented by increased provision for storage, and other sources of supply are in contemplation.

Although several of the older claims are worked out, the water-races are now managed so that large quantities of water are supplied, thus enabling the miners to deal profitably with the gravel-wash that previously did not prove payable.

#### *Rimu and Kanieri.*

A considerable number of miners are still employed in this district, both in sluicing and driving for the wash-dirt overlain by the gravel of the terraces.

The water-race from Kanieri Lake to Seddon Terrace and Back Creek has not yet been commenced. This work, if constructed, will entail the expenditure of a large sum of money. The success of this undertaking depends on the question as to whether the discharge level will prove sufficient to enable the higher terraces to be worked.

#### *Ross.*

The company which has for some years held the claims on Ross Flat having, so far, been unable to raise funds for working the deep levels, the titles to some 300 acres of land which had been held unworked for a number of years have been cancelled. It is now proposed to allow any new company that may be formed to select an area of 100 acres from this land, on condition that a working capital of not less than £20,000 is provided; in addition to which the Government will contribute £10,000, in compliance with regulations for granting assistance towards prospecting at deep levels for the purpose of working the deep leads of gold on this flat.

#### *OTAGO.*

The principal goldfields of Otago are at Tuapeka, Clutha Valley, Manuherikia Valley, Mount Ida, and the Lake Districts. Gold to the value of £20,954,891 has been obtained from the alluvial workings.

#### *Tuapeka.*

The Blue Spur Gold-mining Company is the chief gold-producer in this district, and, with their extensive hydraulic plant, still continues to work the deposit of cemented gravel which furnished employment to the miners since the early days of the rush to Otago. Other sluicing claims are also being worked, and several dredges are employed on the Tuapeka, Waitahuna, and Waipori Rivers.

#### *Clutha Valley.*

This valley, which extends from Beaumont to Cromwell, and contains the most extensive and richest deposits of auriferous gravels yet known in New Zealand, continues to be worked by hydraulic sluicing and dredging. In the Manuherikia tributary of the Clutha River dredging is carried on; and the chief lesser streams and terraces within the Manuherikia basin are worked by hydraulic sluicing.

#### *Lake District.*

A number of dredges are at work in the Kawarau and Shotover Rivers, and sluicing is carried on in the Shotover and Arrow Rivers and their terraces.

#### *Mount Ida.*

The Mount Ida Water-race affords a means of profitable employment to a large number of miners in the vicinity of Naseby, and dredging operations are also carried on.

#### *DREDGING.*

This method of working the gravels of the beds of rivers has been adapted so as to deal with like deposits in those valleys that were no doubt ancient river-beds; the success attendant on the operations of dredges, in districts where very little surface water is to be found, has already demonstrated the fact that moderately deep and wet ground can be profitably worked in places that hitherto were untried, owing to the absence of a plentiful water-supply. There is, therefore, very little doubt that extensive areas of land of the above description, and which contain a modicum of gold in the gravel, will ultimately be dealt with.

The excellent yields obtained from dredging operations in the Cromwell, Clyde, Alexandra, Roxburgh, Miller's Flat, and Island Block Districts along the Clutha or Molyneux River, as well as in the Waipori, Waikaka, Tuapeka, and Milton Districts, has led to the construction of many new dredges throughout Otago. Upwards of seventy dredges are at work, and, as at least seven is the average number of men employed on each, work will be provided for an increased number of men when the new dredges commence work. The number of claims



taken up for dredging is about a hundred and thirty; and although this industry promises to be attended with success, it will be wise on the part of those who intend to embark in it to ascertain first what certain prospect of success exists in particular localities, before incurring the cost of building dredges. It is frequently the case in the initiative of quartz-mining that expensive machinery is erected for the treatment of the products before sufficient work has been done to ascertain what the probable value of the material to be operated on may be. It is to be hoped that similar errors will not be made in the dredging industry.

#### ACCIDENTS ON DREDGES.

The high percentage of fatalities amongst the men employed on dredges (1 per cent.) during the past year has rendered it necessary that provision should be made to insure that all requisite precautions should be taken for the safeguard of the lives of the employes, and it is proposed to introduce legislation dealing with this matter during the session.

#### ACCIDENTS IN GOLD-MINES.

In the Auckland District three fatal accidents occurred; in the West Coast District four, and in the Southern District two, exclusive of accidents on dredges. The total number of fatalities was 14, and the number of miners engaged 14,198, which gives a proportion of about one per thousand.

#### DIVIDENDS.

The following Table shows the Dividends paid by New Zealand Mining Companies during 1897 and 1898.

Name of Company.	Subscribed Capital.	Amount of Capital actually Paid.	Capital.			Dividends.			
			No. of Shares Issued.	Amount of Share.	Paid up per Share.	1897.		1898.	
						Per Share.	Total.	Per Share.	Total.
<i>Auckland.</i>									
Hauraki (Limited) .. .. .	£	£					£		£
New Zealand Crown Mines (Limited)	..	..	80,000	..	..	..	8,000	..	..
Royal Oak of Hauraki (Limited)	..	..		..	..	..	10,000	..	..
Waihi (Limited)* .. .. .	160,000	106,667	160,000	20/	20/	..	64,000	..	12,500
Waiotahi (Limited) .. .. .	18,000	15,000	6,000	20/	30/	..	750	..	32,000
Waitekauri .. .. .	148,000	100,000	148,000	20/	20/	..	14,800	..	300
<i>Nelson and Westland.</i>									
Keep It Dark Quartz .. .. .	20,000	6,208	20,000	20/	16/2½	..	2,000	..	..
Kumara Long Tunnel Sluicing .. .. .	8,000	7,433	16,000	10/	9/3½	..	1,298	..	..
Mont d'Or Mining and Water-race Sluicing (Limited)	12,000	10,800	12,000	20/	18/	..	2,400	..	..
<i>Otago.</i>									
Molyneux Hydraulic .. .. .	..	..	A 5,690 B 4,310	..	..	..	..	..	465/10/0
Glyde Dredge (Limited) .. .. .	3,850	3,840	80	1,000/	1,000/	..	5,800	..	400
Enterprise Gold Dredge .. .. .	2,000	2,000	2,000	20/	20/	..	858	..	500
Ettrick Gold Steam-dredge (Limited)	2,500	1,987	{ 2,500† 2,000†	20/	15/6 20/	..	1,013	..	..
Golden Gate Dredge (Limited) .. .. .	2,500	2,500	2,500	20/	20/	..	2,000	..	..
Golden Run Dredge (Limited) .. .. .	4,000	4,795	6,000	20/	20/	..	5,194	..	..
Golden Treasure Dredge (Limited) .. .. .	1,500	1,884	3,000	20/	20/	..	3,739	..	148/16/0
Jutland Flat Waipori (Limited) .. .. .	15,000	4,000	{ 5,000‡ 10,000†	20/	15/	..	1,500	..	..
Otago Gold-dredging (Limited) .. .. .	4,500	2,000	4,000	20/	20/	..	1,300	..	1,000
Sandhills Dredging .. .. .	..	..	..	..	..	..	125	..	..
Blue Spur and Gabriel's Gully Consolidated Sluicing (Limited)	89,066	30,000	{ 3,500§ 82,298	20/	20/	..	4,078	..	..
Moonlight Sluicing.. .. .	2,000	1,352	2,000	20/	17/6	..	400	..	..
Phoenix Water-race Sluicing .. .. .	1,500	1,500	1,000	30/	30/	..	225	..	..
Roxburgh Amalgamated Mining and Sluicing (Limited)	29,152	12,737	{ 15,000‡ 14,152†	20/	18/	..	841	..	750
Upper Waipori Alluvial Dredging .. .. .	12,000	5,950	{ 10,000‡ 14,000†	10/	10/	..	600	..	..
Morning Star Quartz .. .. .	24,000	2,575	{ A 12,000 B 6,000 C 5,513	20/	8/6 4/9 3/10	..	8,241	..	..
Sew Hoy Big Beach (in liquidation) .. .. .	..	..	..	..	..	..	..	..	1,925

\* Total amount of dividends paid by Waihi Company to date is £276,500.  
† Ordinary.

‡ Contributors. § Vendors. ¶ Preference.

## COAL-MINING.

This industry continues to expand in proportion to local and foreign demands. The further development of gold-mining will also increase the demand for the supply of coal.

The total output from the mines last year was 840,713 tons, as against 792,851 tons for the former year, showing the increased output last year to be 47,862 tons. The coal imported from other countries last year was 110,907 tons, while for the former year there were 101,756 tons, showing an increase in the importation last year of 9,151 tons. The imports were 1,500 tons from the United Kingdom, 109,403 tons from New South Wales, and 4 tons from Victoria. The total export of coal was 82,396 tons; of which 76,073 tons was colonial produce, and 6,323 tons imported coal from other countries. Of the quantity of coal exported, 55,757 tons was for coaling direct steamers trading between the colony and the United Kingdom, and will therefore be treated as in former Statements as coal consumed within the colony, as these steamers are wholly employed in trade between New Zealand and Great Britain. Taking, therefore, the output from our mines and the coal imported, we have a total of 951,620 tons, of which 26,639 tons was exported, leaving the consumption within the colony last year to be 921,097 tons, as against 866,633 tons for the previous year, being an increased consumption last year of 54,464 tons. Taking the output of the different classes of coal from the mines in the colony, there were 504,764 tons of bituminous coal, 34,969 tons of pitch-coal, 268,020 tons of brown coal, and 32,960 tons of lignite; which shows an increased production last year of 31,127 tons of bituminous coal, and a decrease of 75,578 tons of pitch-coal, 88,276 tons of brown coal, and 4,037 tons from the lignite-pits.

The mines in the Kawakawa and Hikurangi Districts show a decrease last year of 3,958 tons, but the Waikato and Mokau mines show an increase of 5,431 tons: giving a net increase on the total output for the North Island of 1,473 tons.

The Westport District mines show an increase of 35,855 tons; also the Nelson mines an increase of 404 tons; but there was a falling off in the districts of Reefton and Greymouth of 10,144 tons: making the net total increase for the West Coast District of 26,115 tons.

The mines in the Canterbury District show an increase of 1,893 tons.

There were also large increases from the mines in the Otago District: North Otago showing an increase of 2,176 tons; South Otago District, 10,769 tons; and the Central Otago District 5,533 tons: making a total net increase for the Otago District of 18,478 tons.

The Southland District shows a decrease last year of 97 tons.

The mines in which there has been the largest output are: The Coalbrookdale, 184,376 tons; Kaitangata, 92,914 tons; Brunner, 85,592 tons; Millerton, Granity Creek, 59,240 tons; Westport-Cardiff, 54,280 tons; Blackball, 43,084 tons; Taupiri Extended, 33,913 tons; Hikurangi, 30,663 tons; Shag Point, 23,334 tons; Nightcaps, 22,762 tons; Taupiri Reserve, 18,870 tons; Kiripaka, 16,248 tons; Waikato, 13,317 tons; Allandale, 11,635 tons; Walton Park, 11,554 tons; New Bay of Islands, 11,134 tons: the output from any of the other mines being under 10,000 tons.

## ACCIDENTS IN COAL-MINES.

Four fatal accidents occurred in the coal-mines during the year 1897: one in the Auckland District and three in the Otago District. The usual inquiries revealed that no blame could be attributed to any one. The total number of coal-miners employed throughout the colony was 1,912; therefore the percentage of fatal accidents is 0.209, or 2.09 per thousand.

## METALLIFEROUS MINES.

Attention is again being directed to search for lodes containing copper, antimony, and other metals; but, with the exception of small shipments of manganese and sulphur from the North Island, chiefly to Australia, the quanti-

ties produced have not been of very great importance. A small shipment of 10 tons of antimony ore, the result of previous operations at Endeavour Inlet, was also exported.

#### OPAL-MINING.

A limited amount of work was done in Mount Peel District on the land taken up by the Record Reign Company, but no stones of any value were found.

In order to enable mining for opals to be carried on in the Tairua District, it is proposed to declare that the provisions of the Mining Acts shall apply to mining for that precious stone in the Hauraki District.

#### PETROLEUM.

The bore-hole at Moturoa, near the Sugar Loaves, at New Plymouth, was continued to a depth of 2,050 ft., and although indications of the presence of petroleum were found, it was determined to cease operations in this immediate locality and commence in a fresh place, four miles and a half away, and at a distance of three miles from the sea.

Samples of petroleum of excellent quality were received from the Cheviot District, but no development work has yet been undertaken.

Nothing has yet been done to explore for petroleum on the mineral lease taken up in the Rotorua District.

#### KAURI-GUM.

Notwithstanding the large quantity of kauri-gum exported every year, there was very little diminution in the amount exported last year, the quantity being 6,641 tons, as against 7,126 tons for the previous year. There was 485 tons less exported this year, the value being less than that of the former year's produce by £33,313, the value of last year's produce being £431,323, which gives an average value of about £60 10s. 6d. per ton, whereas for the present year the average value was £60 per ton.

This industry affords a livelihood to a large number of both Europeans and Natives; but the average earnings of persons employed in digging gum cannot be ascertained. No doubt the time is approaching when the gum will be exhausted, but a considerable period will yet elapse before this takes place. The total quantity of kauri-gum exported since 1853 is 190,570 tons, having a value of £8,512,852. For further information in respect to the industry, I would refer honourable members to the report of the Royal Commission on the subject which has been presented to Parliament (H.—12, 1898).

#### ROADS AND TRACKS.

The expenditure on roads and tracks has greatly increased. The activity in gold-mining demanded greater facilities to enable communications with new districts, which, on account of the discovery of payable reefs, required to be made more readily accessible for prospectors and miners working their claims. It was therefore determined to ask the House last session for an increased vote under these headings. Some of the works have been carried out on the co-operative system, but the majority have been constructed under the supervision of the County Councils and other local bodies in whose districts they are situated.

The total expenditure by the department during the last six years on roads and tracks for the development of the mining industry amounts to £242,963 19s. 8d. in direct grants, and £88,075 0s. 4d. in subsidies to local bodies; out of which £37,410 14s. 3d. and £12,158 6s. 7d. respectively was expended during the year.

#### WATER CONSERVATION AND WATER-RACES.

In continuation of last year's work, the site for the dam at West Eweburn having been tested by boring, &c., a re-examination was made, the site finally approved, and preliminary works in preparing foundations commenced. An examination of the proposed Thames Low-level Water-race has been made, with a view to ascertaining its adaptability for supplying water for increased motive-power; also at Te Aroha, where the water is proposed to be first used as motive-power for lighting the Sanatorium in the Domain with electricity. With a view



to providing a scheme for a supply of water for domestic and fire-extinction purposes at the mining townships of Coromandel, Karangahake, Waihi, and Waitekauri, exhaustive examinations have been made and designs formulated; and reports on the above subjects are now in course of preparation, and will in due course be laid before you. With reference to this matter the mining townships are in a very difficult position, owing to their being situated on Crown land and therefore unable to take advantage of the Loans to Local Bodies Act to borrow money for providing water-supplies. This question is of such importance that it must very shortly be dealt with.

The water-races constructed by the Government, and worked directly under the control of the Mines Department, are the Waimea-Kumara and Mount Ida Water-races. The gross value of the sales of water from the Waimea-Kumara Water-race last year amounted to £3,849, while the expenditure on maintenance was £2,643; leaving a net profit on the workings of £206. The value of the sales of water from the Mount Ida, including the Blackstone Hill Race, amounted to £1,523, while the expenditure on maintenance was £1,416. This leaves a direct profit of £107 on the working of these races during the last year.

#### PROSPECTING.

In the prosecution of prospecting for gold and minerals, assistance was during the year extended to the miners, chiefly through the medium of the County Councils and of the Miners' Associations. The following amounts were paid as subsidies towards prospecting in the different counties, viz.: Manukau, £55 2s. 3d.; Bay of Islands, £212 7s.; Coromandel, £515 6s. 11d., including £503 6s. 11d. paid to the Kapanga Gold-mining Company towards cost of sinking its shaft to 1,000 ft., and continuing to bore to a further depth; Tauranga, £10; Piako, £5 12s. 6d.; Marlborough, £34 6s. 6d.; Grey, £7 10s.; Inangahua, £11 11s.; Westland, £1,240 3s. 2d.; Vincent, £42 9s. 9d.; Wallace, £79 4s.; Southland, £13 3s.; Tuapeka, £118 14s.; Selwyn, £2 5s.; Lake, £10.

The subsidy of £25,000 for sinking a shaft and erecting pumping machinery at the Queen of Beauty Mine, at the Thames, to drain the deep levels to the seaward of the Moanataiari Slide, referred to in previous Statements, has now been all paid; but, owing to the unforeseen delays in receiving the requisite machinery, which had to be obtained from the manufacturers in England, it is not expected that pumping will be commenced for some time. So far as practicable, however, all the machinery which has been received has been placed in position, and the enlargement of the shaft has been completed to a depth of 453 ft.

To further aid the prospector, and afford facilities for crushing and testing parcels of quartz in new districts, the Government has decided on the erection of small plants for that purpose, and regulations have been made for their use by prospecting associations.

#### GEOLOGICAL EXPLORATIONS.

During December last Mr. McKay, the Government Geologist, visited and reported on the western slopes of the Victoria Mountains, in the Reefton District. The report indicates the probable source of the rich auriferous boulders covering the slopes of Kirwan's Hill as being in that vicinity, a matter of some moment to those engaged in the development of that field. During the month of February the same officer visited the copper lodes in the Pukipuki Valley, Whangaroa, and reported thereon, and at the same time examined certain prospecting works in connection with the development of the Kawakawa coalfield. The remainder of the season was devoted to the further elucidation of the geology of Cape Colville Peninsula. This work principally consisted in a careful examination of a part of the southern goldfields within the Ohinemuri County, and the Thames Goldfield. This work has been of an important character, and demonstrates the existence of gold in rocks that have hitherto been regarded as barren of the precious metal; also a close connection between hydro-thermal action, and deposits thereby, at and near the surface, with the deeper-seated veins of the southern goldfields.

In the Thames District Mr. McKay's work principally consisted in an examination of the rocks of that field, and of the various faults by which the reefs have been displaced.

During the progress of his examinations a large number of rock specimens were collected, which will be available for the forthcoming exhibition of the mineral and industrial products of New Zealand, to be held in Auckland towards the close of the present year.

#### MINING MACHINERY.

As in former years, information has been obtained in regard to any new process for the treatment of auriferous and argentiferous ores, and also in regard to new machinery and appliances in connection with mining. By giving the fullest publicity to this subject, opportunity is afforded those persons who are engaged in mining pursuits of obtaining information as to the different patents that have been granted; and, although the machinery or appliance may not in every case come up to the patentee's expectation, the ideas evolved may be the means of improvements being made by some one else who can detect defects in the patents. Plans and specifications of different machines and appliances in connection with mining will be found in the report of the Inspecting Engineer.

#### SCHOOLS OF MINES.

The Schools of Mines where classes are regularly carried on are those at Thames, Reefton, Otago University, Nelson, Waihi, Coromandel, Kuaotunu, and Westport, the instructors in the first two being officers of the Department. The Otago University receives substantial assistance towards the cost of a School of Mines, and subsidy is given towards the salary of the Director at the Waihi and Coromandel Schools; while the Nelson classes are carried on by Mr. Worley, aid being granted towards the cost of plant, chemicals, and apparatus. The instruction given at these schools is becoming year by year of increasing importance, and the number of ex-students from the colonial schools of mines who are occupying important positions in the scientific branches of the mining industry conclusively demonstrates alike the value of the instruction imparted and the ability of the students who have availed themselves of it. Valuable technical education is afforded at the Thames School, where students have opportunities of studying the practical methods of working mines, and of assisting in the treatment of ores for the recovery of gold and silver. A new quartz-crushing plant, with all the latest improvements in reducing, and suitable for the use of the various scientific processes for the extraction of bullion from ores of various kinds, has been recently completed at this school, aided by a grant from the Government. The recently discovered permanganate gold-recovery process for the treatment of ores has also been introduced into this school by Professor Black, who donated to the institution the requisite apparatus for carrying out the work. In the Otago School, also, the use of the new plant for the testing and treatment of ores has afforded students improved opportunities for obtaining the fullest information of a practical character.

At Miller's Flat, and also at Waipori, buildings have been erected, and it is anticipated that classes for practical instruction will shortly be carried on in each of these localities. A site for the Westport School has been provided, and a grant made towards the cost of chemicals and apparatus.

During the year 342 students attended the various Schools of Mines—namely, 199 at the Thames, 63 at Coromandel, 60 at Waihi, 50 at Dunedin, and 30 at Reefton; and, notwithstanding that the average attendance since scholarships were established in December, 1894, is 56, it is somewhat disappointing to find that only two candidates have succeeded in qualifying themselves for scholarships—namely, Mr. W. H. Baker, of the Thames, who is attending the classes at the Auckland University, and Mr. MacLaren, who has passed the University course, having held a scholarship for the specified period of three years.

The expenditure on Schools of Mines during the year was £1,780 17s. 3d., exclusive of teachers' salaries.

## SUMMARY OF EXPENDITURE ON WORKS.

The total expenditure on works authorised by the Department for the development of the mining industry for the year ending the 31st March last amounts to £84,467. These works consist of roads and tracks constructed by direct grants, £37,411; roads and tracks constructed by subsidies to local bodies, £12,158; water-races, £2,272; drainage-channels, £1,212; prospecting-works, £2,358; schools of mines, exclusive of salaries of teachers, £1,780 17s. 3d.; water conservation, £507; telephone lines, £50; compensation on proclamation of rivers, £5,197; and prospecting deep levels, £21,520 15s. The liabilities on the works in progress at the end of March last amounted to £50,721. A detailed statement of the expenditure on these works will be found in the tables annexed to the Inspecting Engineer's report.

## MINING LEGISLATION.

The Mining Bill, to consolidate the existing Act and its several amendments, which was introduced last session, will be again brought forward. The Bill having been widely circulated throughout the colony, amongst all classes of persons interested in the mining industry, has generally met with approval. A very large number of suggested amendments have been received, some of which are forwarded by those who, from experience, are qualified to judge of the varied requirements of the mining community. These suggestions will be submitted for the consideration of the Goldfields and Mines Committee when the measure is before it. The special conditions under which the dredging industry, a form of mining of recent introduction, is now carried on have rendered it necessary that power should be taken to frame regulations to provide for the more efficient management of dredges, and the safety of the workmen employed.

The Sunday Labour in Mines Prevention Act, brought into force last year, has enabled the Inspectors of Mines to enforce compliance with its provisions, and all Sunday labour in mines and batteries, except in those cases in which permission has been granted, has now ceased. Permits have only been granted in cases in which the special conditions under which operations were being carried on demanded their use.

The provisions of the Mining Companies Act Amendment Act of last year, making the directors of no-liability companies by whose authority debts are incurred responsible for the payment thereof, has given a feeling of security to those who work for or supply goods to such companies.

The purchase under the Cyanide Process Gold-extraction Act of the patent rights in New Zealand of the processes known as "the MacArthur-Forrest Processes" has proved of undoubted benefit to the mining industry.

Licenses to use the process to the number of twelve have been issued, and royalty to the amount of £676 17s. 1d. has been collected for the period from the 20th August, 1897, to the 31st March last.

It has become apparent that the liability of mine-owners under the provisions of section 383 of "The Mining Act, 1891," and section 52 of "The Coal-mines Act, 1891," in cases where serious accidents occur to any of their employes, is proving a grave obstruction to the development of the mining industry. The Government intend to frame measures defining the mutual liabilities of employers and those who are employed both in coal- and gold-mining.

Representatives of English capital invested in the Auckland goldfields have drawn attention to the taxes and disabilities under which it is alleged they suffer, and which grievances they state call for redress. Amongst their grounds for complaint are the tax of 1 per cent. per annum on the amount of the nominal capital of the companies, the tenure of mining properties, excessive ground-rent, export duty on gold, and import duty on machinery. It is proposed by legislation to exempt mining companies from the tax of 1 per cent., and to provide for a term of license for mining properties of forty-two years with right of renewal; but the import and export duties in force will not at present be altered. The question of reducing rents on claims held for gold-mining is one which requires very careful consideration, as the rents form part of the revenue of local govern-

ing bodies in mining districts, which have to incur large expenditure in the construction and maintenance of roads, &c., which are of direct benefit to the companies engaged in mining. It might be inferred from some of the statements made that the legislation in question was specially brought into operation since the introduction of capital from outside the colony for the development of mining. This, however, has not been the case, as the measures have been in existence for years past; and the land was occupied and companies were formed with full knowledge of the then existing laws and regulations, and of the obligations incumbent upon them. At the same time, due consideration has evidently not been given by investors to the general interest displayed by the Legislature in promoting the industry by large annual contributions from the Public Works Fund towards the construction of roads, bridges, and tracks, assistance towards prospecting, the development of deep levels, and other works.

#### DEPARTMENTAL.

##### “NEW ZEALAND MINES RECORD.”

The publication of “The New Zealand Mines Record,” which was commenced by the Mining Bureau in August, 1897, has been continued monthly. Judging by the inquiries received from Australia, Great Britain, the United States, and South Africa, the “Record” is scanned for information by those who have already invested, and by many persons who may have an idea of putting a portion of their spare capital into mining investments in New Zealand; while articles on improved gold-saving and milling appliances enable mining men in this colony to keep abreast of the times. The monthly publication of battery returns and statistics, initiated by the Bureau, has been followed in Western Australia, and is in contemplation by the Governments of other colonies. Geological reports and special articles have been reprinted from the “Record,” and copies forwarded to the Agent-General; others have been put into pamphlet form for circulation amongst the miners.

#### CONCLUSION.

In conclusion, I would point out that the state of the mining industry is now on a more stable basis than was the case last year. A large number of claims that were taken up for purely speculative purposes have been abandoned, and it may now be assumed that the areas held will be developed by steady prospecting and intelligent conduct of operations, which, with careful and economical management, should, in the majority of cases, prove remunerative. The prosperity of the industry has, no doubt, received a check from the undue speculation which prevailed during the recent “boom” in the North, but the amount of capital already invested, and still being invested in the development of the more prominent mines will, it is anticipated, secure fair returns.

I cannot, however, too strongly impress upon all persons who may be interested in gold-mining the advisableness of opening up and developing their mines before proceeding with the erection of expensive machinery and appliances for treatment of the ores.

In the southern districts capital is being freely invested in the dredging industry, and if ordinary precautions are taken to avoid the errors fallen into elsewhere, there is little doubt that an increased yield of gold will result in the employment of a large number of men. Renewed attention is being paid to hydraulic sluicing in the West Coast, Otago, and Southland Districts, where prospects appear favourable.

The construction of roads and tracks for opening up new fields, and also for improving the means of communication in the older districts, is still of urgent necessity, and ample provision must again be made for the vigorous continuance of necessary works. In order to aid in the further development of the industry, substantial grants will also be required for prospecting, water-conservation, and deep-level mining.

## No. 1.

TABLE showing the COMPARISON in QUANTITY and VALUE of GOLD ENTERED FOR EXPORTATION, and also the QUANTITY and VALUE of other MINERALS produced, for the Years ending the 31st December, 1896 and 1897, as well as the TOTAL VALUE since JANUARY, 1853.

Name of Metal or Mineral.	For Year ending the 31st December, 1897.		For Year ending the 31st December, 1896.		Total from the 1st January, 1853, to the 31st December, 1897.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Precious metals—	Oz.	£	Oz.	£	Oz.	£
Gold .. .. .	251,645	980,204	263,694	1,041,428	13,565,552	53,372,684
Silver .. .. .	188,892	20,872	94,907	10,589	1,085,162	202,724
Total gold and silver .. .. .	438,537	1,001,076	358,601	1,052,017	14,650,714	53,575,358
Mineral produce, including kauri-gum—	Tons.	£	Tons.	£	Tons.	£
Copper-ore .. .. .	..	2	..	..	1,894½	17,868
Chrome-ore .. .. .	..	..	..	..	5,666	37,967
Antimony-ore .. .. .	10	157	21	450	3,610	52,361
Manganese-ore .. .. .	180	541	65	205	18,285½	58,534
Hematite-ore .. .. .	..	..	..	..	52½	226
Mixed minerals .. .. .	1,561	5,892	37	1,335	15,874	78,782
Coal exported .. .. .	76,078	69,595	79,524	71,984	974,999	958,241
Coke exported .. .. .	..	..	105	263	16,343	24,781
Coal, output of mines in colony .. .. .	764,640	382,320	713,327	356,664	10,601,614	5,300,807
Kauri-gum .. .. .	6,641	398,010	7,126	481,328	190,570	8,512,853
Total quantity and value of minerals .. .. .	849,105	856,517	800,205	862,224	11,828,408½	15,041,819
Value of gold and silver, as above .. .. .	..	1,001,076	..	1,052,017	..	53,575,358
Total value of minerals produced, including gold and silver .. .. .	..	1,857,593	..	1,914,241	..	68,617,177

## No. 2.

TABLE showing the QUANTITY and VALUE of GOLD ENTERED for EXPORTATION from NEW ZEALAND for the Years ending the 31st March, 1897 and 1898, and the TOTAL QUANTITY and VALUE from 1857 to the 31st March, 1898.

District and County or Borough.	Year ending 31st March, 1898.		Year ending 31st March, 1897.		Increase or Decrease for Year ending 31st March, 1898.		Total Quantity and Value from January, 1857, to 31st March, 1898.	
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.		
<b>AUCKLAND—</b>	Oz.	£	Oz.	£	Oz.	Oz.	Oz.	£
County of Coromandel ..	16,712	70,544	27,404	113,116	..	10,692	..	..
County of Thames ..	4,014	16,656	3,941	16,572	73	..	..	..
County of Ohinemuri ..	83,732	297,704	57,115	205,981	26,617	..	..	..
County of Piako ..	90	357	125	521	..	35	..	..
County of Manukau ..	..	..	..	..	..	..	..	..
County of Marsden ..	..	..	..	..	..	..	..	..
County of Whangarei ..	..	..	..	..	..	..	..	..
Borough of Thames ..	3,942	16,341	5,291	22,041	..	1,349	..	..
Te Aroha Town District ..	..	..	..	..	..	..	..	..
	108,490	401,602	93,876	358,231	14,614	..	2,167,375	8,170,266
<b>WELLINGTON</b> ..	..	..	..	..	..	..	188	706
<b>MARLBOROUGH—</b>								
County of Marlborough ..	619	2,400	789	3,070	..	170	..	..
Blenheim Borough ..	..	..	..	..	..	..	..	..
Picton Borough ..	..	..	..	..	..	..	..	..
	619	2,400	789	3,070	..	170	85,764	334,099
<b>NELSON—</b>								
County of Waimea ..	38	124	498	1,815	..	465	..	..
County of Collingwood ..	725	2,729	2,036	7,729	..	1,311	..	..
	758	2,853	2,534	9,544	..	1,776	1,673,139	6,633,183
<b>WEST COAST—</b>								
County of Buller ..	8,480	33,918	10,899	43,518	..	2,419	..	..
County of Inangahua ..	9,727	38,913	12,615	50,459	..	2,888	..	..
County of Grey ..	23,754	95,014	20,772	83,170	2,982	..	..	..
County of Westland ..	21,078	84,312	23,709	94,907	..	2,631	..	..
Brunnerton Borough ..	..	..	..	..	..	..	..	..
Kumara Borough ..	295	1,182	311	1,244	..	16	..	..
Hokitika Borough ..	808	3,227	384	1,532	424	..	..	..
Ross Borough ..	1,979	7,915	2,858	11,431	..	879	..	..
Reefton Borough ..	..	..	..	..	..	..	..	..
	66,121	264,481	71,545	286,261	..	5,427	4,324,897	17,199,434
<b>CANTERBURY</b> ..	..	..	..	..	..	..	24	96
<b>OTAGO—</b>								
County of Taieri ..	1,462	5,597	1,708	6,904	..	246	..	..
County of Tuapeka ..	17,568	70,976	25,011	101,834	..	7,443	..	..
County of Vincent ..	20,523	83,008	23,430	95,507	..	2,907	..	..
County of Maniototo ..	7,213	29,166	10,040	40,929	..	2,827	..	..
County of Waihemo ..	497	2,031	687	2,802	..	190	..	..
County of Waikouaiti ..	144	589	602	2,464	..	458	..	..
County of Waitaki ..	1,621	6,516	1,814	7,436	..	193	..	..
County of Bruce ..	978	3,939	1,042	4,180	..	64	..	..
County of Lake ..	10,043	41,021	11,315	46,349	..	1,272	..	..
County of Wallace ..	6,699	26,920	5,823	23,451	876	..	..	..
County of Fiord ..	5,292	21,179	3,333	13,191	1,959	..	..	..
County of Southland ..	3,413	13,713	3,282	13,273	131	..	..	..
County of Stewart Island ..	..	..	50	200	..	50	..	..
County of Clutha ..	51	207	29	116	22	..	..	..
Borough of Alexandra ..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	..	..	..	..	..	..
	75,504	304,862	88,166	358,636	..	12,662	5,383,511	21,306,286
<b>Unknown</b> ..	..	..	..	..	..	..	123	484
<b>Totals</b> ..	251,492	976,198	256,918	1,015,742	..	5,421	13,635,020	53,644,444

## No. 3.

TABLES showing the TOTAL QUANTITY and VALUE of GOLD ENTERED for DUTY for EXPORTATION from the 1st January, 1857, to the 31st December, 1897. (This return shows the produce of the various goldfields. Gold entered at Nelson from Hokitika, Greymouth, and Westport is put under the head of "West Coast," and gold from Invercargill and Riverton under the head of "Otago.")

Year.	Auckland.		Nelson.		Marlborough.		West Coast.		Otago.		Wellington.		Canterbury.		Total.	
	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.
1857	..	£	10,437	40,432	..	..	..	..	..	..	..	..	..	..	10,437	£
1858	..	1,192	18,226	51,272	..	..	..	..	..	..	..	..	..	..	18,226	51,272
1859	..	..	7,336	28,427	..	..	..	..	..	..	..	..	..	..	7,336	28,427
1860	..	..	4,538	17,585	..	..	..	..	..	..	..	..	..	..	4,538	17,585
1861	..	..	6,385	24,552	..	..	..	..	..	..	..	..	..	..	6,385	24,552
1862	..	4,098	10,422	40,386	..	..	..	..	..	..	..	..	..	..	10,422	40,386
1863	..	13,853	9,580	37,120	..	..	..	..	..	..	..	..	..	..	9,580	37,120
1864	..	10,552	14,410	55,841	..	..	..	..	..	..	..	..	..	..	14,410	55,841
1865	..	17,096	12,137	47,080	..	..	..	..	..	..	..	..	..	..	12,137	47,080
1866	..	17,463	7,650	29,643	..	..	..	..	..	..	..	..	..	..	7,650	29,643
1867	..	18,277	9,123	35,918	..	..	..	..	..	..	..	..	..	..	9,123	35,918
1868	..	168,874	5,999	38,386	..	..	..	..	..	..	..	..	..	..	5,999	38,386
1869	..	434,687	10,631	42,524	..	..	..	..	..	..	..	..	..	..	10,631	42,524
1870	..	319,146	12,244	48,692	..	..	..	..	..	..	..	..	..	..	12,244	48,692
1871	..	1,188,708	10,014	40,056	..	..	..	..	..	..	..	..	..	..	10,014	40,056
1872	..	369,341	8,175	32,700	..	..	..	..	..	..	..	..	..	..	8,175	32,700
1873	..	437,123	18,697	54,786	..	..	..	..	..	..	..	..	..	..	18,697	54,786
1874	..	305,068	5,642	22,158	..	..	..	..	..	..	..	..	..	..	5,642	22,158
1875	..	262,156	4,577	17,866	..	..	..	..	..	..	..	..	..	..	4,577	17,866
1876	..	221,905	14,018	55,862	..	..	..	..	..	..	..	..	..	..	14,018	55,862
1877	..	408,627	5,867	21,092	..	..	..	..	..	..	..	..	..	..	5,867	21,092
1878	..	250,454	4,468	17,228	..	..	..	..	..	..	..	..	..	..	4,468	17,228
1879	..	154,295	2,993	11,424	..	..	..	..	..	..	..	..	..	..	2,993	11,424
1880	..	176,416	3,222	12,223	..	..	..	..	..	..	..	..	..	..	3,222	12,223
1881	..	141,326	3,453	13,039	..	..	..	..	..	..	..	..	..	..	3,453	13,039
1882	..	131,007	3,289	12,494	..	..	..	..	..	..	..	..	..	..	3,289	12,494
1883	..	163,618	2,064	7,724	..	..	..	..	..	..	..	..	..	..	2,064	7,724
1884	..	143,564	2,159	8,002	..	..	..	..	..	..	..	..	..	..	2,159	8,002
1885	..	170,416	2,798	10,397	..	..	..	..	..	..	..	..	..	..	2,798	10,397
1886	..	128,140	2,582	9,979	..	..	..	..	..	..	..	..	..	..	2,582	9,979
1887	..	131,564	2,914	10,829	..	..	..	..	..	..	..	..	..	..	2,914	10,829
1888	..	139,556	3,027	11,320	..	..	..	..	..	..	..	..	..	..	3,027	11,320
1889	..	113,191	3,252	12,310	..	..	..	..	..	..	..	..	..	..	3,252	12,310
1890	..	125,760	2,856	11,049	..	..	..	..	..	..	..	..	..	..	2,856	11,049
1891	..	181,185	4,445	16,896	..	..	..	..	..	..	..	..	..	..	4,445	16,896
1892	..	186,558	3,535	13,145	..	..	..	..	..	..	..	..	..	..	3,535	13,145
1893	..	45,714	8,167	30,604	..	..	..	..	..	..	..	..	..	..	8,167	30,604
1894	..	211,974	2,860	10,684	..	..	..	..	..	..	..	..	..	..	2,860	10,684
1895	..	430,862	2,460	9,016	..	..	..	..	..	..	..	..	..	..	2,460	9,016
1896	..	350,355	2,753	10,393	..	..	..	..	..	..	..	..	..	..	2,753	10,393
1897	..	392,837	1,892	7,055	..	..	..	..	..	..	..	..	..	..	1,892	7,055
Totals	2,137,970	8,059,394	253,720	1,002,006	85,450	392,835	5,719,263	32,730,339	5,368,828	21,246,324	278	1,044	48	192	18,565,552	58,872,684



**No. 4.**  
**TABLE showing the TOTAL QUANTITY and VALUE of MINERAL ORES other than Gold (the Product of New Zealand Mines), COAL, COKE, and KAURI-GUM, EXPORTED from the Colony up to the 31st December, 1897.**

Year.	Silver.		Copper-ore.		Chrome-ore.		Antimony-ore.		Manganese-ore.		Hematite-ore.		Mixed Mineral Ore.		Coal.		Coke.		Kauri-gum.		Total.	
	Oz.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
1853	..	£	..	£	..	£	..	£	..	£	..	£	..	£	..	£	..	£	880	15,972	880	15,972
1854	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,861	28,864	1,861	28,864
1855	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	355	4,514	355	4,514
1856	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,440	18,591	1,440	18,591
1857	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,523	35,251	2,523	35,251
1858	..	..	351	5,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,167	25,066	2,167	25,066
1859	..	..	245	2,605	8	120	..	..	..	..	..	..	..	..	..	..	..	..	2,263	28,501	2,263	28,501
1860	..	..	187	1,590	116	1,440	..	..	..	..	..	..	..	..	..	..	..	..	1,900	12,688	1,900	12,688
1861	..	..	110	1,300	52	520	..	..	..	..	..	..	..	..	..	..	..	..	1,018	11,708	1,018	11,708
1862	..	..	51	1,024	8,843	24,719	..	..	..	..	..	..	..	..	..	..	..	..	4,987	86,850	4,987	86,850
1863	..	..	..	..	595	4,818	..	..	..	..	..	..	..	..	..	..	..	..	1,995	31,844	1,995	31,844
1864	..	..	..	..	768	4,910	..	..	..	..	..	..	..	..	..	..	..	..	2,996	65,500	2,996	65,500
1865	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,867	46,060	1,867	46,060
1866	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,077	72,287	3,077	72,287
1867	..	..	246	2,700	281	1,815	..	..	..	..	..	..	..	..	..	..	..	..	3,904	81,419	3,904	81,419
1868	..	..	84	977	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,690	74,690	2,690	74,690
1869	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,800	111,907	2,800	111,907
1870	..	..	7	120	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5,054	175,074	5,054	175,074
1871	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,231	198,593	8,231	198,593
1872	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1873	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
1874	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	177	2,175	177	2,175
1875	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	824	10,325	824	10,325
1876	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1877	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
1878	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	177	2,175	177	2,175
1879	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	824	10,325	824	10,325
1880	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1881	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
1882	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	177	2,175	177	2,175
1883	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	824	10,325	824	10,325
1884	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1885	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
1886	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	177	2,175	177	2,175
1887	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	824	10,325	824	10,325
1888	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1889	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
1890	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	177	2,175	177	2,175
1891	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	824	10,325	824	10,325
1892	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1893	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
1894	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	177	2,175	177	2,175
1895	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	824	10,325	824	10,325
1896	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	185	2,388	185	2,388
1897	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	118	1,348	118	1,348
Totals	1,085,162	202,724	1,894	17,868	5,666	87,867	3,610	52,861	18,285	58,534	52	286	15,874	78,793	974,999	958,241	16,848	24,781	190,570	8,512,862	1,085,162	202,724
																					9,948,786	

Norm.—Silver-ore, 37 tons, £1,325.

## No. 5.

RETURN showing the QUANTITY and VALUE of COALS IMPORTED into NEW ZEALAND during the Quarter ended the 31st March, 1898.

Country whence imported.							Quantity.	Value.
							Tons.	£
Victoria	..	..	..	..	..	..	1	5
New South Wales	..	..	..	..	..	..	26,844	24,282
Totals							26,845	24,287

## No. 6.

TABLE showing the INCREASE or DECREASE in the PRODUCTION of COAL in the Colony, and Imported, Year by Year, during the last Twenty Years.

Year.	Coal raised in the Colony.		Coal imported.		
	Tons.	Yearly Increase.	Tons.	Plus or Minus.	Increase and Decrease.
1878 .. .. .	162,218	..	174,148	..	..
1879 .. .. .	231,218	69,000	158,076	—	16,072
1880 .. .. .	299,923	68,705	123,298	—	33,778
1881 .. .. .	337,262	37,339	129,962	+	6,664
1882 .. .. .	378,272	41,010	129,582	—	380
1883 .. .. .	421,764	43,492	123,540	—	6,042
1884 .. .. .	480,831	59,069	148,444	+	24,904
1885 .. .. .	511,063	30,232	130,202	—	18,242
1886 .. .. .	534,353	23,290	119,873	—	10,329
1887 .. .. .	558,620	24,267	107,230	—	12,643
1888 .. .. .	613,895	55,275	101,341	—	5,889
1889 .. .. .	586,445	27,450	128,063	+	26,722
1890 .. .. .	637,397	50,952	110,939	—	17,124
1891 .. .. .	668,794	31,397	125,318	+	14,379
1892 .. .. .	673,315	4,521	125,453	+	135
1893 .. .. .	691,548	18,233	117,444	—	8,009
1894 .. .. .	719,546	27,998	112,961	—	4,483
1895 .. .. .	726,654	7,108	108,198	—	4,763
1896 .. .. .	792,851	66,197	101,756	—	6,442
1897 .. .. .	840,713	47,862	110,907	+	9,151

## No. 7.

TABLE showing the OUTPUT of COAL from the various Mining Districts, and the Comparative INCREASE and DECREASE, for the Years 1896 and 1897, together with the TOTAL APPROXIMATE QUANTITY of COAL produced since the Mines were opened.

Name of District.	Output of Coal.		Plus or Minus.	Increase or Decrease.	Approximate Total Output of Coal up to 31st December, 1897.
	1897.	1896.			
	Tons.	Tons.		Tons.	Tons.
Kawakawa and Hikurangi .. .. .	53,449	53,586	—	137	974,187
Whangarei, Kamo, Ngunguru, and Whau-whau .. .. .	17,285	21,106	—	3,821	375,053
Waikato .. .. .	66,125	61,899	+	4,226	950,857
Mokau .. .. .	3,148	1,943	+	1,205	13,653
Pelorus .. .. .	..	..	..	..	711
West Wanganui .. .. .	908	504	+	404	49,766
Westport .. .. .	298,551	262,696	+	35,855	2,642,983
Reefton .. .. .	2,865	3,795	—	930	70,672
Greymouth .. .. .	128,676	137,890	—	9,214	2,395,928
Malvern .. .. .	13,710	11,714	+	1,996	341,685
Timaru .. .. .	..	103	—	103	10,657
Otago .. .. .	212,292	193,814	+	18,478	3,324,297
Southland .. .. .	43,704	43,801	—	97	426,164
Totals .. .. .	840,713	792,851	+	47,862	11,576,613

## No. 8.

TABLE showing the DIFFERENT CLASSES of COAL from the MINES in the COLONY.

Name of Coal.	Output of Coal.		Increase or Decrease.	Approximate Total Output of Coal up to the 31st December, 1897.
	1897.	1896.		
	Tons.	Tons.	Tons.	Tons.
Bituminous .. .. .	504,764	473,637	+31,127	6,146,449
Pitch .. .. .	84,969	110,547	-75,578	1,686,056
Brown .. .. .	268,020	179,744	+88,276	3,866,254
Lignite .. .. .	32,960	28,923	+ 4,037	377,854
Totals .. .. .	840,713	792,851	+47,862	11,576,613

## No. 9.

TABLE showing the NUMBER of COAL-MINES in OPERATION, the NUMBER of MEN EMPLOYED, and the OUTPUT of COAL per MAN.

Number of Mines working.	Number of Miners employed in each Mine.	Total Number of Men employed.	Output of Coal during 1897.	Average Output per Man.
			Tons.	Tons.
112	1 to 4 men in each .. ..	171	52,012	304
19	5 to 10 " .. ..	129	45,945	356
4	11 to 20 " .. ..	60	25,979	433
18	21 men and upwards .. ..	1,552	716,777	462
153		1,912	840,713	439

## No. 10.

RETURN showing the QUANTITY and VALUE of COAL IMPORTED INTO and EXPORTED FROM NEW ZEALAND during the Year ended the 31st December, 1897.

Imported.				Exported.			
Countries whence imported.		Quantity.	Value.	Countries to which exported.		Quantity.	Value.
		Tons.	£			Tons.	£
United Kingdom .. ..	..	1,500	1,238	United Kingdom .. ..	..	54,005	53,445
New South Wales .. ..	..	109,403	96,885	Victoria .. ..	..	2	2
Victoria .. ..	..	4	16	New South Wales .. ..	..	5,281	4,270
				Queensland .. ..	..	2	10
				Tasmania .. ..	..	1,437	856
				United States of America—			
				On the West Coast .. ..	..	2,953	2,346
				Fiji Islands .. ..	..	7,766	5,838
				South Sea Islands .. ..	..	10,784	8,426
				Norfolk Island .. ..	..	166	180
Totals .. ..	..	110,907	98,139	Totals .. ..	..	82,396	75,373

NOTE.—Foreign coal included in exportation to—United Kingdom, 1,319 tons, value £1,205; New South Wales, 1,611 tons, value £1,459; Tasmania, 21 tons, value £28; United States of America—On the West Coast, 880 tons, value £792; South Sea Islands, 2,372 tons, value £2,174. Norfolk Island, 120 tons, value £120. The remainder is New Zealand produce.

## No. 11.

NUMBER of MINERS EMPLOYED during the Years ending 31st March, 1897 and 1898.

Mining District.	Alluvial Miners.		Quartz-miners.		Totals.		Grand Total.	
	European.	Chinese.	European.	Chinese.	European.	Chinese.	1898.	1897.
<b>AUCKLAND—</b>								
North Hauraki and Coromandel ..	..	..	1,101	..	1,101	..	1,101	1,329
Thames .. .. .	..	..	756	..	756	..	756	1,527
Ohinemuri .. .. .	..	..	1,895	..	1,895	..	1,895	1,820
Te Aroha .. .. .	..	..	184	..	184	..	184	100
Puhipuhi .. .. .	..	..	10	..	10	..	10	25
Tauranga .. .. .	..	..	10	..	10	..	10	35
Great Barrier .. .. .	..	..	6	..	6	..	6	36
	..	..	3,962	..	3,962	..	3,962	4,872
<b>MARLBOROUGH—</b>								
Pelorus .. .. .	..	..	1	..	1	..	1	6
Wairau .. .. .	36	..	7	..	43	..	43	30
Cullen's Creek .. .. .	19	..	..	..	19	..	19	50
Waikakaho .. .. .	3	..	..	..	3	..	3	10
Wakamarina .. .. .	59	..	2	..	61	..	61	80
Kaituna .. .. .	..	..	..	..	..	..	..	6
	117	..	10	..	127	..	127	182
<b>NELSON—</b>								
Wangapeka, Baton, and Sherry ..	..	..	..	..	..	..	..	42
Takaka .. .. .	42	..	..	..	42	..	42	..
Collingwood .. .. .	60	6	80	..	140	6	146	216
Motueka .. .. .	20	..	..	..	20	..	20	14
Inangahua .. .. .	187	195	421	..	608	195	803	677
Ahaura .. .. .	420	293	66	..	486	293	779	783
Charleston .. .. .	149	..	..	..	149	..	149	290
Westport, including Addison's, Northern Terraces, Waimanga- roa, North Beach, Mokihinui, Karama, and Lower Buller Valley	390	..	10	..	400	..	400	350
Lyell .. .. .	32	14	57	..	89	14	103	76
Murchison .. .. .	200	120	..	..	200	120	320	172
Owen .. .. .	..	..	..	..	..	..	..	..
	1,500	628	634	..	2,134	628	2,762	2,560
<b>WESTLAND—</b>								
Ross .. .. .	90	4	7	..	97	4	101	190
Stafford and Goldsborough ..	420	100	..	..	420	100	520	550
Hokitika and Kanieri .. .. .	450	30	..	..	450	30	480	490
Kumara .. .. .	350	100	..	..	350	100	450	450
Greymouth .. .. .	650	210	20	..	670	210	880	735
Arnold .. .. .	..	..	..	..	..	..	..	..
Okarito .. .. .	85	1	..	..	85	1	86	71
	2,045	445	27	..	2,072	445	2,517	2,426
<b>OTAGO—</b>								
Hindon .. .. .	64	..	51	..	115	..	115	50
Tuapeka .. .. .	450	200	40	..	490	200	690	690
Clyde and Alexandra .. .. .	410	125	12	..	422	125	547	560
Cromwell .. .. .	340	152	30	..	370	152	522	498
Roxburgh .. .. .	358	70	10	..	368	70	438	460
Black's .. .. .	135	45	3	..	138	45	183	178
Tapanui .. .. .	20	20	..	..	20	20	40	80
Waikaia .. .. .	270	45	..	..	270	45	315	190
Wyndham .. .. .	12	..	..	..	12	..	12	12
Longwood .. .. .	..	..	..	..	..	..	..	..
Orepuki .. .. .	380	100	60	..	390	100	490	428
Roundhill and Wilson's River	..	..	..	..	..	..	..	..
Wakatipu Goldfields—Arrow, Macetown, Cardrona, Kawarau, Bracken's, and Motatapu	200	20	100	..	300	20	320	375
Queenstown .. .. .	350	25	125	..	475	25	500	600
Naseby, Kyeburn, Clarke's, and Mount Burster	..	..	..	..	..	..	..	..
Hamilton, Sowburn, &c.	..	..	..	..	..	..	..	..
Hyde and Fullerton's .. .. .	315	152	34	..	349	152	501	631
Serpentine .. .. .	..	..	..	..	..	..	..	..
Macrae's, Strath-Taieri, Shag Valley, Nenthorn, St. Bathans, and Ida Valley	..	..	..	..	..	..	..	..
Maerewhenua and Kurow .. .. .	105	..	..	..	105	..	105	105
Pembroke .. .. .	40	12	..	..	40	12	52	52
	3,399	966	465	..	3,864	966	4,830	4,849
<b>SUMMARY.</b>								
AUCKLAND .. .. .	..	..	3,962	..	3,962	..	3,962	4,872
MARLBOROUGH .. .. .	117	..	10	..	127	..	127	182
NELSON .. .. .	1,500	628	634	..	2,134	628	2,762	2,560
WESTLAND .. .. .	2,045	445	27	..	2,072	445	2,517	2,426
OTAGO .. .. .	3,399	966	465	..	3,864	966	4,830	4,849
Totals .. .. .	7,061	2,039	5,098	..	12,159	2,039	14,198	14,889

Approximate Cost of Paper.—Preparation, not given; printing (3,750 copies), £21 4s.

Price 9d.

By Authority: JOHN MACKAY, Government Printer, Wellington.—1898.

1898.  
NEW ZEALAND.

# THE GOLDFIELDS OF NEW ZEALAND:

REPORT ON ROADS, WATER-RACES, MINING MACHINERY,  
AND OTHER WORKS IN CONNECTION WITH MINING.

*Presented to both Houses of the General Assembly by Command of His Excellency.*

## CONTENTS.

			Page
Goldfields, Roads, Water-races, Mining Machinery, and other Works in connection with Mining, Report on, by George Wilson, Inspecting Engineer .. ..	1-229	Quartz-workings— <i>continued</i> . North Island— <i>continued</i> .	
Subsidised Roads and Tracks .. ..	1	Puru District .. ..	49
Roads constructed by Direct Grants .. ..	2	Tararu District .. ..	49-50
Prospecting for Gold .. ..	2	Shellback District .. ..	50
Schools of Mines .. ..	2-22	Kuranui District .. ..	50-51
Thames School of Mines .. ..	3-13	Moanatairi District .. ..	51-52
Waihi School of Mines .. ..	14	Grahamstown District .. ..	52
Coromandel School of Mines .. ..	14-15	Thames Big Pump .. ..	53
Nelson School of Mines .. ..	16	Waioatahi District .. ..	53-54
Reefton School of Mines .. ..	16-19	Waioaraka District .. ..	54-57
Otago School of Mines .. ..	19-21	Block XXVII. District .. ..	57
Expenditure on Schools .. ..	21-22	Shortland District .. ..	57
Water-races .. ..	22-23	Karaka District .. ..	58
Waimea Water-race .. ..	22-23	Una Hill and Te Papa District .. ..	58
Callaghan's .. ..	23	Hape Creek District .. ..	58
Kumara Water-race .. ..	23-24	Puriri District .. ..	58-59
Waimea-Kumara Water-races .. ..	24	Otunui District .. ..	59
Summary showing Results of Working the Ku- mara Water-races for Fifteen Years, from 1st April, 1883, to 31st March, 1898 .. ..	25	Mangakirikiri District .. ..	60
Mount Ida Water-race .. ..	27	Matatoki District .. ..	60
Blackstone Hill Water-race .. ..	27-28	Hibi District .. ..	60
Summary of Water-races—Statement of Profit and Losses on the Working of the Water-races for the last Twenty Years .. ..	28	Neavesville District .. ..	60
Gold- and Silver-mining .. ..	29-155	Tairua River District .. ..	60
Quartz-workings .. ..	29-107	Ohui District .. ..	60
List of Companies outside the Colony interested in Mining in New Zealand .. ..	29-31	Whangamata District .. ..	60-61
North Island .. ..	31-84	Ohinemuri District .. ..	61-73
Puhipuhi .. ..	31	Abstract of Special Claims, &c., Ohinemuri .. ..	61-65
Abstract of Special Claims, Whangarei .. ..	31	Maratoto District .. ..	66
Ohaeawai .. ..	31	Komata District .. ..	66-68
Great Barrier Island .. ..	31-32, 160-162	Owharoa District .. ..	68
Abstract of Special Claims, Great Barrier Island .. ..	32	Waihi District .. ..	68-70
Egerton .. ..	32	Wharekuraupunga District .. ..	70
White Cliffs .. ..	32	Waitekauri .. ..	70-73
Coromandel District .. ..	32-44	Te Aroha District .. ..	73-74
Abstract of Special Claims, Coromandel .. ..	33-36	Abstract of Special Claims, &c., Te Aroha .. ..	73
Abstract of Special Claims, Kuaotunu .. ..	36	Piako District .. ..	73-74
Port Charles District .. ..	36	Tauranga District .. ..	74-76
Cabbage Bay District .. ..	36	Abstract of Special Claims, &c., Tauranga .. ..	75
Kennedy Bay District .. ..	36-37	Tauranga and Katikati Districts .. ..	75
Paul's Creek District .. ..	37	Te Puke District .. ..	76
Waikoromiko District .. ..	37	List of Machinery supplied .. ..	76
Tokatea District .. ..	37-38	Return of Stone crushed, Auckland District .. ..	77
Kapanga District .. ..	38-39	Return of Quartz-crushing Machines, Auck- land District .. ..	78-79
Kauri Block .. ..	39-41	Return of Quartz crushed and Gold obtained, Auckland District .. ..	79-81
Preece's Point .. ..	41	Comparative Statement showing Increase or Decrease for Years 1896-97 and 1897-98 .. ..	82
Karaka and Pukemaukuku Blocks .. ..	41-42	Comparative Statement of Returns for Hau- raki Mining District for Years ending 31st March, 1897 and 1898 .. ..	83
Matawai District .. ..	42	Waihi Gold-mining Company's Returns .. ..	84
Manaia District .. ..	42	Middle Island .. ..	84-107
Tiki District .. ..	42	Nelson and West Coast Districts .. ..	84-97
Kauri Gold Estates Company .. ..	42-43, 157-160	Abstract of Licenses for Special Claims, &c. .. ..	85-89
Matarangi District .. ..	43	Marlborough .. ..	89
Kuaotunu District .. ..	43	Collingwood District .. ..	89-90
Mercury Bay District .. ..	43	West Wanganui .. ..	89
Boat Harbour .. ..	44	Taitapu .. ..	89-90
Thames District .. ..	44-61	Motueka .. ..	90
Abstract of Special Claims, Thames .. ..	44-48	Westport .. ..	90-91
Mata District .. ..	48	Mokihinui .. ..	90-91
Tapu District .. ..	48-49	Lyell .. ..	91
Waiomo District .. ..	49	Reefton .. ..	91-96
		Crushington .. ..	91-92
		Merrifjigs .. ..	93
		Painkiller .. ..	93-94
		Victoria Range .. ..	94-96

Quartz-workings—continued.		Page		Page
Grey District .. .. .	96	Statement of Affairs of Mining Companies, as published in accordance with the Mining Companies Acts, 1891 and 1894 .. .. .	185-141	
Blackball .. .. .	96	List of Prospecting Licenses issued .. .. .	142	
Paparoa Ranges .. .. .	96	Petroleum .. .. .	143	
Moonlight .. .. .	96	Manganese and Sulphur .. .. .	143	
Langdon's .. .. .	96	Opals .. .. .	143	
Ross District .. .. .	97	Scheelite, Wolfram, and Molybdenite .. .. .	143	
Cedar Creek .. .. .	97	Copper .. .. .	143-144	
Battery Returns, West Coast Districts .. .. .	97-107	Specimen System of Monthly Returns of Mine Operations .. .. .	144-148	
Otago and Southland Districts .. .. .	98-99	Amendment to Mining Companies Act .. .. .	148	
Abstract of Special Claims, &c. .. .. .	100-102	Cyanide Process .. .. .	148-150	
Macetown District .. .. .	102	Regulations .. .. .	149-150	
Skipper's Creek, Bullendale .. .. .	102	Sunday Labour in Mines .. .. .	150-151	
Shotover .. .. .	102-103	Provisional Warrants .. .. .	152	
Carriek Range .. .. .	103	Testing Plants for Quartz Prospectors .. .. .	152	
Bendigo .. .. .	103	Water-conservation .. .. .	152	
Old Man Range .. .. .	103-104	New Zealand Mines Record .. .. .	153	
Macrae's Flat .. .. .	104	Aid to Deep-level Mining .. .. .	153	
Barewood .. .. .	104-105	Geological Examinations .. .. .	153	
Flat Stream .. .. .	105	Diamond-drills .. .. .	153-154	
Table Hill .. .. .	105	Fatalities in Mines .. .. .	154	
Lawrence .. .. .	105	Fatalities on Dredges .. .. .	154	
Riverton .. .. .	105	List of Rivers proclaimed as Water-courses for deposit of Tailings .. .. .	154-155	
Wilson's River .. .. .	105	Coal-mining .. .. .	156-157	
Preservation Inlet .. .. .	106	North Island .. .. .	156	
Returns from Quartz-mines for Year ending 31st March, 1898 .. .. .	106-107	Middle Island .. .. .	156	
Alluvial Mining .. .. .	107-126	Accidents in Coal-mines .. .. .	156-157	
Abstract of Licenses for Special Claims, &c. .. .. .	107-110	Hunt Coal-cracker .. .. .	157	
Marlborough .. .. .	110-111	Masut .. .. .	157	
Mahakipawa .. .. .	110-111	Kauri Freehold Gold Estates: Supplementary Report .. .. .	157-160	
Nelson .. .. .	111-112	Great Barrier Reefs: Supplementary Report .. .. .	160-162	
Takaka .. .. .	111	Permanganate Gold-recovery Process, by Professor Black .. .. .	162-167	
Collingwood .. .. .	111-112	Electro-deposition of Gold upon Gold in drifts. Paper by Wm. Skeay .. .. .	167-171	
Motueka .. .. .	112	A remarkable Mineral Water. Paper by Wm. Skeay .. .. .	172	
West Coast .. .. .	112-116	Relative strength of wrought-iron and steel pipes .. .. .	172-174	
Westport .. .. .	112-113	Ore-treatment in Boulder County, Colorado .. .. .	174-176	
Charleston .. .. .	113	Temperature in Amalgamation .. .. .	176-177	
Inangahua .. .. .	113	Patent Rights granted .. .. .	175-193	
Grey .. .. .	113	Improved Process for extracting Gold from Ore, &c., by J. G. Black .. .. .	177-179	
Ahaura .. .. .	113-114	New Process for the treatment of Gold and Auriferous Ores, entitled "Etard's Gold Dissolvent" .. .. .	179-180	
Kumara, Waimea, and Stafford .. .. .	114	An improved apparatus for the treatment of Slimes, &c., by T. J. Denny .. .. .	180-181	
Arahura .. .. .	114-115	Improvements in or relating to the treatment of Ores and in apparatus therefor, by E. B. Parnell .. .. .	181-184	
Arahura Flat .. .. .	115	Improvements in the treatment of Ores, Tailings, and the like, by John Poole .. .. .	184-18	
Rimu, Black Creek, and Seddon's Terrace .. .. .	115	A Respirator for use in dry-crushing, by H. F. Way .. .. .	18	
Ross .. .. .	115	An improved combined Furnace and Precipitating Apparatus for recovering Gold from Charcoal or similar substances, by J. Turnbull .. .. .	186-188	
Okarito and Jackson's Bay .. .. .	115	Improvements in extracting Precious Metals from minerals containing them, and apparatus therefor, by Beda Becker .. .. .	188-189	
Otago and Southland .. .. .	116-126	Improved apparatus for saving fine Gold, by G. H. Otway .. .. .	189-190	
Abstract of Licenses for Special Claims, &c. .. .. .	116-118	An improved method and apparatus for treating refractory Ores containing Gold, Silver, Nickel, and the like, by J. E. Preston .. .. .	190-191	
Maerewhenua .. .. .	119	Improvement in Wet Process for extracting Gold from Gold Ores or Ore Wastes, by A. F. Lundstrom .. .. .	192	
Naseby .. .. .	119	Improvements in the treatment of Minerals for smelting or other purposes, by R. F. Strong .. .. .	192-193	
Welshman's Gully .. .. .	119	Improvements in the Cyanide Process, by A. McLean Cameron .. .. .	193	
St. Bathans .. .. .	119	Mine-managers' Examination Papers .. .. .	194-205	
Matakau .. .. .	119	List of Mining Managers, Battery Superintendents, and Engine-drivers who have obtained Certificates under the Mining and Coal-mines Acts of 1886, 1891, and 1894 .. .. .	206-209	
Cromwell .. .. .	119	Summary of Works constructed .. .. .	209-212	
Lowburn .. .. .	119	Concluding remarks .. .. .	212	
Cardrona .. .. .	119	List of Works on Goldfields undertaken wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, in progress on the 31st March, 1898 .. .. .	213-217	
Bannockburn .. .. .	120	List of Works on Goldfields constructed wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, and completed prior to the 31st March, 1898 .. .. .	217-228	
Kawarau .. .. .	120	Return showing the Value of the Sales of Water, and Expenditure on and Collateral Advantages derived from the Working of the Water-races constructed and maintained by Government during the Year ending the 31st March, 1898 .. .. .	229	
Clyde, Alexandra, and Molyneux .. .. .	120			
Lawrence .. .. .	120-121			
Weatherstone's .. .. .	121			
Waitahuna .. .. .	121			
Waipori .. .. .	121-122			
Shotover .. .. .	122			
Arthur's Point .. .. .	122			
Skipper's Point .. .. .	122			
Arrow River .. .. .	122-123			
Arrowtown .. .. .	123			
Macetown .. .. .	123			
Waikaia .. .. .	123			
Parawa .. .. .	123-124			
Nokomai .. .. .	124			
Colac Bay .. .. .	124-125			
Orepuki .. .. .	125-126			
Waiau .. .. .	126			
Stewart Island .. .. .	126			
Dredging .. .. .	115-116, 126-134			
Marlborough and West Coast .. .. .	115-116			
Otago and Southland .. .. .	126-134			
Abstract of Licenses for Dredging .. .. .	127-130			
Naseby .. .. .	130			
Waikaka .. .. .	130			
Shotover .. .. .	130			
Waipori .. .. .	131			
Island Block .. .. .	131			
Miller's Flat .. .. .	131			
Roxburgh .. .. .	131			
Alexandra .. .. .	131-132			
Cromwell .. .. .	132			
Nevis .. .. .	132			
Tuapeka .. .. .	132			
Weatherstone's .. .. .	132			
Tuapeka Mouth .. .. .	132			
Waitahuna .. .. .	132			
Glenore .. .. .	132			
Taparui .. .. .	132			
Accidents in Dredging .. .. .	132			
Yields from Dredging .. .. .	132-133			
Description of Dredges .. .. .	134			

1898.  
NEW ZEALAND.

THE GOLDFIELDS OF NEW ZEALAND:

REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND  
OTHER WORKS IN CONNECTION WITH MINING.

*Presented to both Houses of the General Assembly by Command of His Excellency.*

Mr. GEORGE WILSON, Inspecting Engineer, to the Hon. A. J. CADMAN, Minister of Mines.

SIR,—

Mines Department, Wellington, 12th May, 1898.

I have the honour to submit my annual report, for the year ending the 31st March last, on the progress of the mining industry, and on different works in connection with the same having a tendency to promote a further development of the mineral wealth of the colony.

SUBSIDISED ROADS AND TRACKS.

The following statement will show the expenditure on subsidy principle authorised for the construction of roads and tracks in the different counties for the year ending the 31st March last, and the liabilities on outstanding authorities on that date:—

Name of Local Body.	Expenditure for the Year ending 31st March, 1898.			Liabilities on Authorities on 31st March, 1898.		
	£	s.	d.	£	s.	d.
Piako County ... ..	145	0	0	125	0	0
Coromandel County ... ..	1,325	0	0	600	0	0
Te Aroha Town Board ... ..	43	15	0	31	5	0
Thames County ... ..	104	4	6	466	15	6
Thames Borough ... ..	600	0	0	588	0	0
Ohinemuri County ... ..	516	7	2	1,773	4	7
Katikati Highway Board ... ..	88	6	8	100	0	0
Pieton Road Board ... ..	...	...	...	50	0	0
Collingwood County... ..	100	0	0	100	0	0
Pelorus Road Board... ..	...	...	...	30	0	0
Buller County ... ..	516	13	4	983	6	8
Inangahua County ... ..	80	9	0	19	11	0
Grey County ... ..	1,850	0	0	1,971	10	0
Westland County ... ..	36	13	3	57	12	0
Tuapeka County ... ..	5,348	7	3	1,331	9	3
Lake County ... ..	500	0	0	1,000	0	0
Southland County ... ..	...	...	...	450	0	0
Vincent County ... ..	850	0	0	...	...	...
Contingencies ... ..	53	10	5	...	...	...
Totals ... ..	12,158	6	7	9,677	14	0



## ROADS CONSTRUCTED BY DIRECT GRANTS.

The following statement will show the expenditure and liabilities on authorities issued on roads from direct grants to the several local bodies during the year ending the 31st March, 1898 :—

Name of Local Body.	Expenditure for the Year ending 31st March, 1898.	Liabilities on Authorities on 31st March, 1898.
	£ s. d.	£ s. d.
Te Puke Road Board ... ..	250 0 0	...
Matamata Road Board ... ..	...	100 0 0
Bay of Islands County ... ..	500 0 0	...
Whangarei County ... ..	350 0 0	200 0 0
Tauranga County ... ..	680 0 0	730 0 0
Coromandel County ... ..	100 0 0	150 0 0
Thames County ... ..	3,503 14 2	3,360 5 3
Ohinemuri County ... ..	1,621 11 11	2,649 13 7
Piako County ... ..	1,764 16 10	...
Pelorus Road Board ... ..	786 5 3	402 14 9
Collingwood County ... ..	1,040 0 0	1,975 0 0
Wairau Road Board ... ..	360 1 0	673 3 8
Waimea County ... ..	...	250 0 0
Buller County ... ..	2,495 0 0	4,700 0 0
Inangahua County ... ..	2,434 6 5	2,459 16 0
Grey County ... ..	2,395 6 11	3,580 0 0
Westland County ... ..	4,792 18 2	2,285 5 3
Ross Borough Council ... ..	100 0 0	150 0 0
Wallace County ... ..	250 0 0	250 0 0
Taieri County ... ..	...	500 0 0
Lake County ... ..	550 0 0	400 0 0
Southland County ... ..	200 0 0	...
Tuapeka County ... ..	1,659 2 1	1,922 19 3
Vincent County ... ..	950 0 0	800 0 0
Land and Survey Department ... ..	9,241 0 8	6,368 19 7
Public Works Department ... ..	1,386 10 10	...
Totals ... ..	37,410 14 3	33,907 17 4

## PROSPECTING FOR GOLD.

The following statement will show the expenditure and liabilities on authorities issued in subsidies to prospecting associations and parties of miners recommended by the local bodies in the different counties for the year ending the 31st March last :—

Name of County.	Expenditure for Year ending 31st March, 1898.	Liabilities on Authorities on 31st March, 1898.
	£ s. d.	£ s. d.
Piako County ... ..	5 12 6	12 2 6
Bay of Islands County ... ..	212 7 0	110 3 0
Manukau County ... ..	55 2 3	14 2 3
Coromandel County ... ..	515 6 11	255 15 11
Tauranga County ... ..	10 0 0	6 0 0
Marlborough County ... ..	34 6 6	...
Grey County ... ..	7 10 0	80 0 0
Inangahua County ... ..	11 11 0	153 4 9
Westland County ... ..	1,240 3 2	754 16 4
Selwyn County ... ..	2 5 0	17 15 0
Tuapeka County ... ..	118 14 0	104 16 0
Lake County ... ..	10 0 0	13 0 0
Southland County ... ..	13 3 0	17 7 0
Vincent County ... ..	42 9 9	15 0 3
Maniototo County ... ..	...	20 0 0
Wallace County ... ..	79 4 0	7 10 0
Totals ... ..	2,357 15 1	1,581 13 0

## SCHOOLS OF MINES.

The average attendance of students at the Thames School, although there is a slight decrease compared with last year, shows that the interest evinced is still well maintained, and that the

opportunity to avail themselves of the higher education afforded is still considered of the highest importance by the students.

The number of students attending the classes is regulated in a great measure by the facilities for obtaining employment in mines situated within a reasonable distance from the class-rooms; and the attendance both at the Thames and at Reefton schools has fallen off through the mines in their vicinity being not so fully in a position to furnish employment as formerly.

The opening of schools at Coromandel and at Waihi has also induced students to attend the classes in those schools, and the number attending at both places shows that the desire on the part of the miners to acquire all the higher branches of knowledge is still maintained. Therefore the number of students throughout the Hauraki District has been increased in a marked degree.

The schools at Waipori and at Miller's Flat, to which assistance has been furnished by the Government, are not yet in the position to afford students an opportunity of attending classes.

The school in connection with the Otago University continues to steadily advance, the attendance for the year being greater than in any previous year.

The attendance at the school at Nelson shows that the same amount of interest is taken by the students as formerly. The classes are presided over by Mr. W. F. Worley, who devotes his spare time to the advancement of the students.

The following reports have been furnished by Mr. F. B. Allen, M.A., B.Sc., the Director of the Thames School; Mr. R. M. Aitken, Director of the Reefton School; Mr. P. G. Morgan, M.A., Instructor of the Waihi School; Mr. James M. Maclaren, M.A., Instructor of the Coromandel School; Professor George H. F. Ulrich, F.G.S., Director of the Otago School; and Mr. W. F. Worley, of the Nelson School, and show the results of the annual class-examinations, the subjects taught, the number of ore-samples that have been assayed, and the returns from the larger parcels treated at the different reduction plants at the schools. It is thus apparent that the public are greatly benefited by the institution of the schools, where, for a reasonable charge, the full value of any ore or mineral substance can be readily determined, and the most approved process for treatment in order to recover the different metals ascertained.

#### THAMES SCHOOL.

Mr. F. B. Allen, M.A., B.Sc., Director of the Thames School of Mines, reports as follows:—

I have the honour to furnish the following annual report of the Thames School of Mines for the twelve months ending the 31st March, 1898:—

The twelve months just ended has been an extremely busy period for the school, which has been taxed to its utmost capacity to cope with the large increase in work. The attendance at the classes, which has steadily increased since the end of 1895, reached its maximum in the middle term of 1897, and the experimental plant was kept in constant employment testing trial parcels of ore by various processes, until, at the end of the year, it was closed down for alterations and repairs.

Two changes have been made in the teaching staff. At the end of June, Mr. P. G. Morgan, M.A., relinquished his duties as assistant, which for close on twelve months, during a very busy period, he had discharged with untiring energy and zeal. On the 1st August, 1897, Mr. W. A. MacLeod, B.A., B.Sc., was appointed to fill the vacancy, and has carried out his arduous duties in an entirely satisfactory manner. At the end of 1897 Mr. John Parr, B.Sc., M.E., terminated his engagement as drawing-master, in order to go to Australia. Mr. Parr proved an excellent teacher, with a thorough knowledge of his subject, and under his guidance the drawing-class made rapid progress. His successor, Mr. E. J. Williams, commenced duty at the beginning of 1898. He has shown himself to be thoroughly competent, and has gained the confidence of the students under his charge. Mechanical drawing is a very essential portion of the work of a mining school, and to insure proper attention being paid to this important branch requires the constant attention of a capable instructor.

The average number of individuals attending the school during 1897–98 is 136. The average attendance of registered students has been 98, a slight falling-off from the previous year, although at one time (viz., during the second term of 1897) the roll of registered students included the large number of 128. Since that time the number of students attending classes has been decreasing. The attendance at the school is of necessity regulated partly by the state of the mining industry in the district. Latterly active mining has been largely superseded by development work, the erection of plants and batteries, and in the meantime comparatively little gold has been won on the Thames field. Men have had to journey to the up-country districts in search of employment, while new-comers to the Thames have been fewer than in former years. The effect on the school has been to lower the attendance from the abnormal height it had reached during the first two terms of 1897 to something more like an average number. The attendance, however, is still in excess of that of two years ago. Moreover, the majority of the present students are in active employment, and it is partly because of the smaller number this year of that section of the students who are not working in the mines or elsewhere that the attendance has decreased. The school has been designed and the course of study arranged for the advantage and instruction of men employed in the mine or battery, and each student, if he could so arrange matters, would find it to his advantage to obtain outside employment either in the direction of mining or of metallurgy during the time that he is studying, so as to combine the practical with the theoretical.

During the last twelve months two new schools of mines have been started, for the purpose of giving regular instruction in mining and kindred subjects. The Waihi School is under the leadership of Mr. P. G. Morgan, M.A., the late assistant at the Thames School, the one at Coromandel being under Mr. J. M. Maclaren, formerly a pupil of the Thames School, and the winner of a School

of Mines scholarship. The inception of these two schools, and the greater ease with which employment can be obtained in their vicinity, will, no doubt, militate to a certain extent against overcrowding at this school.

An important alteration has been made this year in the conduct of public assay-work. A commodious wooden building has been built round the large chimney of the old assay-room, and is fitted with furnace, muffles, grinding-plate rolls, fume-chamber, sink, benches, &c., and all the necessary apparatus, while adjoining it is a compact well-lighted balance-room, for which a new and expensive bullion-balance has been imported from London. This separate assay department supplies a long-felt want, and the public will have the satisfaction of knowing that their assays are performed by a competent assayer in a building entirely distinct and separate from that used by the students. It will also materially aid the teaching staff in the efficient control of both the public assay-work and the teaching department. The following table shows the number of public assays performed during the last twelve months :—

Number of public assays ... ..	487
Number of assays in connection with ton parcels of ore ... ..	413
Total ... ..	900

The great majority of samples for assay are sent from districts outside of the Thames, and many come from various parts of New Zealand other than Auckland.

Extensive alterations have been made in the experimental plant. As the old battery could not cope with the large increase in the number of test parcels, and was, besides, constantly needing repair, it was decided to shut down, and make the necessary improvements. First of all, with a view to giving the necessary increase in motive-power, a new 9 in. main, a quarter of a mile long, was laid down so as to connect the battery in a straight line with the county's large supply-pipe. A new valve and all necessary connections were fitted to the main, and this portion of the work completed before Christmas, 1897. The plant was then shut down in December, new foundations for the mortar-block, three new stamps, cams and cam-shaft were placed in position, and special housing round the box was built up to prevent the escape of dust in dry-crushing.

The mortar-box has been placed in a lower position, and the stages and platforms altered. The ore now passes through a Dodge rock-breaker near the furnace, and is fed into the stamps automatically by a Challenge self-feeder. Bucket elevators, fastened on belting, convey the dry-crushed ore from the front of the stamper-box into a large sheet-iron hopper, whence it is distributed by means of shoots to the amalgamating-pans and cyanide-vats as required.

A trial run of the new machinery was made in the middle of March, 1898, and, after a few alterations, the work of crushing test parcels was resumed. The new battery has been kept busy ever since, and several parcels are now on hand awaiting treatment.

There has been no lack of test parcels during the last twelve months, and although, owing to an enforced idleness of three months while the above-mentioned alterations were in progress, the total number of parcels treated is less, still the plant, while in repair, was in constant work, and the average for the nine months is well up to that of the previous twelve months. During the nine months the plant was working sixty-two parcels, aggregating 89,211 lb., were treated, of which thirty-seven were pan-amalgamated, thirteen treated by potassium-cyanide, and twelve were miscellaneous, as shown by the accompanying tables. It was found necessary to subject four of the parcels to a chloridizing roast before treatment. The average percentage of saving by amalgamation amounted to 83·8 per cent., and by cyanide to 61·6 per cent., much the same as during the previous year.

In the list of the experimental treatment of the various parcels of ore several poor extractions are noticeable. In considering these, and in fact all the figures of percentages, it should be remembered that the plant has been erected for experimental purposes, and is worked accordingly. It is not a works for reduction and extraction purposes, but rather one to which the owner of a parcel may bring his ore, have it tested by some process he himself decides upon, or, leaving the matter to the discretion of the Director, has the parcel treated by perhaps several different methods, all of which cannot result equally well. The poor extractions have in many cases resulted from treating the ore according to the instructions of the owner, who has probably, however, obtained thereby just as much valuable information concerning the ore as he would have had the parcel been treated successfully by some other process. Low extractions in experimental treatment teach valuable lessons only less in importance to those afforded by the discovery of the most successful mode of treatment.

In many instances my instructions have been to test the ore by cyanide, and demonstrate by experiment whether or not the ore is suited to this process. Where, however, the process named by the owner as the one to be adopted has yielded poor results the test has in most cases been supplemented by treating the parcel by a second or even a third method, and generally a satisfactory extraction has been obtained. Amalgamation and the cyanide process are the most common processes adopted. Chlorination tests are made on certain ores, and tailings are usually cyanided. Latterly a new process, the permanganate (chlorination) process, has been added to the above list.

Dr. Black carried out various experiments in connection with his patent in the Thames School of Mines plant, and on his departure donated a set of his apparatus to the school. As I am thoroughly acquainted with the working details and the chemistry of the process, the school is now in a position to treat small parcels of ore by this method.

The school is gradually gathering together a representative collection of minerals, and thanks are due to the Under-Secretary and the Inspectors of Mines for donations of mineral specimens.

Two samples of telluride-ore from West Australia, forwarded by the Hon. A. J. Cadman, Minister of Mines, are of especial interest. The Council hope to be able in course of time to form a mineral museum in connection with the school, and to devote a separate room or building to the collection. Many specimens, especially samples of fossils, are still required before this laudable object can be accomplished.

During the year a large number of journeys were made into the surrounding district in connection with field geology, and the students have had opportunities of visiting the mines and studying mining geology and surveying underground. The practical illustrations thus afforded have been invaluable as an aid to the class-work.

My thanks are due to the Council, who have manifested their untiring interest in the welfare of the school; to Messrs. Morgan and MacLeod, who have in turn discharged their duties in a highly creditable manner; and to Mr. P. Callan, who, with Mr. John Parr, ably carried on the work of the assistant for one month before Mr. MacLeod's appointment. I have much pleasure in acknowledging the willing assistance of Mr. D. Finn, who has filled the position of laboratory assistant throughout the year; and, in connection with the experimental test plant, Mr. B. Vercoe has discharged his arduous and responsible duties to my entire satisfaction.

The following is a table of the attendances at the several classes:—

TABLE of ATTENDANCES for Year ending 31st March, 1898.

Name of Subject.	1897.			1898.
	First Term.	Second Term.	Third Term.	First Term.
<i>Registered Students.</i>				
General and mining geology ... ..	15	15	15	12
Mineralogy and blowpipe ... ..	15	16	15	13
Land- and mine-surveying ... ..	53	54	40	31
Mathematics ... ..	17	14	12	11
Mining and applied mechanics ... ..	50	50	40	29
Metallurgy of gold and silver ... ..	...	23	20	...
Practical chemistry .. ...	42	49	32	22
Theoretical chemistry ... ..	40	43	30	20
Practical assaying ... ..	62	65	48	40
Mechanical drawing ... ..	22	23	19	21
Mineralogy and geology (combined course) ... ..	...	...	...	14
Total ... ..	316	352	271	213
Saturday science class ... ..	29	24	27	65
Total attendance at classes ... ..	345	376	298	278
Individual registered students ... ..	117	128	94	72
Total individual students ... ..	146	152	121	137

The annual examinations were held in December, 1897, the papers being set by examiners in Wellington, appointed by the Government—viz., Mr. George Wilson, Inspecting Engineer; Mr. William Skey, Government Analyst; Mr. Alexander McKay, F.G.S.; Mr. C. H. Pierard; and the Surveyor-General.

A large number of candidates presented themselves, and they showed a higher proficiency than usual. Sixty per cent. of the candidates obtained first-class certificates, and 25 per cent. second class.

Two President's medals were awarded for the highest aggregate, one each to Messrs. Donovan and Metcalfe, who were bracketed equal, with the high average of 87 per cent. Mr. Barrance, whose average was 90 per cent., was ineligible, as he won the medal last year.

At the end of 1897 I held a practical examination in mineralogy and geology, the result of which, combined with those of the theoretical papers set by the Wellington examiners, showed that Mr. H. E. Metcalfe obtained the high average of 86 per cent., and he was consequently awarded the Director's prize, a clinometer and compass, given for the highest aggregate in the above subjects.

The following table shows the results of the late examinations :—

RESULTS OF ANNUAL EXAMINATIONS, 1897.

Subject of Examination.	First Class.	Second Class.	Third Class.	Failed.	Total.
General and mining geology ... ..	2	2	...	2	6
Pumping and winding ... ..	4	1	...	...	5
Ventilation and explosives ... ..	4	2	...	...	6
Mining and applied mechanics ... ..	7	...	...	...	7
Theoretical chemistry (senior) ... ..	4	2	...	...	6
Theoretical chemistry (junior) ... ..	...	...	1	...	1
Practical chemistry (senior) ... ..	3	2	...	...	5
Practical chemistry (junior) ... ..	...	2	...	...	2
Practical assaying, dry (senior) ... ..	9	7	4	3	23
Practical assaying, dry (junior) ... ..	...	...	...	...	...
Practical assaying, wet (senior) ... ..	4	1	...	4	9
Practical assaying, wet (junior) ... ..	2	1	...	...	3
Surveying (land and mine) ... ..	3	2	1	...	6
Map-drawing ... ..	6	1	1	...	8
Mineralogy and blowpipe ... ..	2	2	...	...	4
Metallurgy ... ..	6	...	...	...	6
Mechanical drawing ... ..	4	...	...	...	4
<b>Totals</b> ... ..	<b>60</b>	<b>25</b>	<b>7</b>	<b>9</b>	<b>101</b>

Three students competed for the scholarship, obtaining the following average percentages K. M. Barrance, 89·6 per cent.; W. Donovan, 86·6 per cent.; H. E. Metcalfe, 84·6 per cent. No award was made.

The following tables show the separate parcels of ore treated during nine months of the past year, and the returns therefrom. The value of the bullion recovered amounts to £280, a somewhat higher average per month than for the preceding twelve months. The great majority of the ores received at the Thames School for treatment are not suited to the cyanide process. Amalgamation of the tailings after a previous cyanide treatment is not satisfactory in practice, but with many of the ores cyanide can be used to recover from the tailings the bullion that has escaped amalgamation. This would point towards wet-crushing and amalgamation as the most suitable process for the field generally, followed by cyanide on the tailings.

Subject to permission granted by the Director, students are allowed to obtain practical experience in the metallurgical plant, and several—viz., Messrs. Croucher, Banks, Finn, Campbell, and others—have rendered valuable assistance from time to time.

7

TABULATED STATEMENT showing PARCELS of ORE treated at Thames School of Mines Experimental Plant during 1897-98.

Name of Mine or Owner and District.	Description of Ore	Dry Weight of Ore.	Assay-value of Ore per Ton.			Bullion saved.	Value per Ounce.	Percentage saved.		
			Assay-value of Ore per Ton.		Value.			Gold.	Silver.	Value.
			Gold.	Silver.						
BY PAN-AMALGAMATION.										
...	Grey quartz, with sulphides ...	Lb. 1,800	Oz. dwt. gr. 2 10 10	Oz. dwt. gr. 53 13 18	£ s. d. 15 9 0	Oz. dwt. gr. 38 12 12	86.2	79.3	83.8	
...	Greenish-brown and earthy ...	875	6 5 1	3 6 19	25 6 0	3 7 22	91.6	89.3	91.6	
...	Light brown and clayey ...	920	0 8 19	0 12 14	1 16 5	0 8 12	90.1	90.1	90.1	
...	Grey splintery quartz ...	560	0 3 18	0 12 13	0 16 1	0 3 12	89.2	78.6	88.4	
...	Grey mullocky quartz ...	224	0 7 13	0 8 19	1 10 11	0 1 10	85.8	85.4	85.8	
...	Black sand ...	900	0 0 15	0 0 3	0 2 6	*	*	*	*	
...	Country-rock containing quartz stringers	2,500	0 6 7	0 5 1	1 5 7	0 11 16	91.8	88.2	91.7	
...	Bluish quartz ...	1,600	0 1 6	0 1 18	0 5 2	0 1 18	85.8	76.9	85.6	
...	Splintery quartz, mineralised ...	1,300	0 1 18	0 1 13	0 7 2	0 1 16	86.6	85.9	86.4	
...	Crystalline, with blue veins ...	1,120	0 12 13	5 5 21	3 0 9	2 3 13	84.7	67.2	81.4	
...	Hard rusty-coloured quartz ...	2,250	2 18 14	1 15 7	11 17 10	4 7 14	93.6	89.6	93.4	
...	Glassy quartz, with patches of mineral	640	1 0 7	10 16 18	5 2 1	0 10 0	56.8	3.0	45.3	
...	Rubble, with quartz stringers	2,000	10 13 19	2 17 9	43 0 2	11 16 14	97.4	95.3	97.4	
...	Glassy quartz and blue mullock	1,500	0 0 22	0 0 14	0 3 9	0 0 20	86.5	77.6	85.5	
...	Glassy quartz and blue mullock	3,000	0 2 12	0 1 6	0 10 1	0 4 4	85.5	79.1	85.5	
...	Light-brown and flinty ...	600	0 2 12	0 1 9	0 10 1	0 0 18	74.1	64.1	74.0	
...	Veins of white quartz in slate	1,800	4 5 17	1 3 7	17 4 10	4 2 18	94.4	91.3	94.4	
...	Heavily mineralised	2,000	0 5 1	0 2 12	1 0 5	0 4 12	71.3	57.3	71.1	
...	Clean white quartz	2,000	0 5 1	0 6 7	1 0 9½	0 8 6	83.4	75.6	83.2	
...	Tailings and shells	500	0 4 0	0 5 1	0 16 6	0 1 16	86.2	79.5	85.8	
...	Densely mineralised	2,000	0 4 0	0 5 1	0 16 6	0 1 16	86.2	79.5	85.8	
...	Semi-transparent quartz with much FeS <sub>2</sub>	2,240	+	+	+	+	+	+	+	
...	Mullocky and heavily mineralised	1,120	+	+	+	+	+	+	+	
...	Very mullocky, with much FeS <sub>2</sub>	1,120	+	+	+	+	+	+	+	
...	White quartz, with blue veins	2,560	1 11 18	7 6 5	7 1 7	7 14	89.9	61.3	86.9	
...	Grey quartz, with sulphides	1,220	1 16 13	11 6 20	8 8 10	4 17 12	80.3	60.2	77.6	
...	Reddish-brown and mullocky	2,100	0 5 16	0 9 11	1 3 7½	0 12 0	86.5	78.0	85.4	
...	Blue mud and shells	1,500	0 2 2	0 6 7	0 8 11½	0 5 0	81.7	89.6	82.1	
...	Blue quartz, with calcite veins	360	37 5 22	18 0 10	150 19 8	8 13 8	97.8	96.2	97.8	
...	Grey quartz, with sulphides	1,050	1 7 17	12 10 19	6 15 11	4 18 18	80.9	74.0	79.7	
...	Grey quartz, with sulphides	300	1 7 17	12 10 19	6 15 11	1 0 10	81.6	44.9	74.8	
...	Clean tailings ...	2,240	0 5 1	0 5 1	1 0 8	0 7 12	81.0	66.7	80.0	
...	Clean bluish quartz	495	0 2 6	0 0 6	0 9 0	0 1 6	81.5	78.9	81.4	
...	Clean bluish quartz	560	0 2 0	0 0 6	0 8 0	0 1 6	81.5	78.9	81.4	
...	Clean bluish quartz	510	0 1 15	0 0 5	0 6 6	0 1 6	81.5	78.9	81.4	

\* Not estimated.

† Too poor to estimate.

TABULATED STATEMENT showing PARCELS of ORE treated at Thames School of Mines Experimental Plant during 1897-98—continued.

Name of Mine or Owner and District.	Description of Ore.	Dry Weight of Ore.	Assay-value of Ore per Ton.			Bullion saved.	Value per Ounces.	Percentage saved.												
			Gold.	Silver.	Value.			Gold.	Silver.	Value.										
BY CYANIDE.																				
		Lb.	Oz.	dwt.	gr.	£	s.	d.	Oz.	dwt.	gr.	£	s.	d.						
E. J. Banks, Maratoto ...	Glassy quartz, with iron-oxides ...	2,250	0	10	22	2	19	14	2	8	7	1	16	19	0	17	3½	66-9	57-6	65-8
Waitekauri King ...	Splintery, and containing iron and manganese ...	4,000	1	11	4	1	5	12	6	7	2	4	12	15	2	3	2	88-0	87-8	88-0
Alpha, Waitekauri ...	Crystalline, with blue veins...	2,000	0	12	13	5	5	21	3	0	9	2	14	16	0	9	4	46-1	51-5	47-0
Alpha, Waitekauri ...	Tailings ...	2,100	0	5	1	3	10	14	1	7	3	1	16	16	0	11	0	89-9	48-3	79-1
Waitangi, Thames ...	Glassy quartz, mineralised ...	1,750	0	10	2	2	10	10	2	5	4	1	11	20	0	16	6	75-3	62-9	74-0
Kawakawa ...	Light-brown and flinty quartz ...	1,400	0	2	12	0	1	9	0	10	1	0	0	17	1	13	2	18-2	49-3	18-2
Royal Standard, Wharekiraupunga ...	Clean white quartz ...	7,500	1	3	22	2	12	22	5	1	0	12	3	0	1	5	9	92-9	87-4	92-6
Royal Standard, Wharekiraupunga ...	Clean white quartz ...	800	2	1	14	8	18	21	9	4	2	2	16	6	0	16	2	70-2	60-4	69-3
Union Beach ...	Black mud and shells ...	1,300	0	4	0	0	5	1	0	16	6	0	0	20	1	6	10	11-3	19-1	11-5
Ohui ...	White quartz, with blue veins ...	2,880	2	7	22	8	1	8	10	7	9	6	3	18	0	16	3	37-4	42-2	37-7
Mahara Royal, Tapu ...	Coarse tailings, clean ...	4,480	0	5	13	0	5	16	1	2	9	0	18	12	1	19	4½	80-0	81-0	80-1
Sheridan, Tapu ...	Tailings ...	2,520	0	2	18	0	3	0	0	11	3½	0	5	0	1	18	2½	75-0	77-4	75-0
Golden Point, Tapu ...	Glassy quartz, mullocky ...	1,500	0	0	22	0	0	14	0	3	9	0	0	15	2	10	5	63-1	60-8	63-0

The tailings from two of the above parcels treated by cyanide were pan-amalgamated, and an extra percentage of bullion recovered thereby.—

		Percentage Saving of Original Assay-value.	
		Gold.	Silver.
Royal Standard ...	By cyanide ...	70-2	60-4
	By pan ...	10-5	4-1
	Total extraction ...	80-7	64-5
Ohui ...	By cyanide ...	37-4	42-2
	By pan ...	30-9	25-8
	Total extraction ...	68-3	68-0



Besides the above parcels which passed through the complete battery process, various others, on account of their small size and richness, were subjected to berdan treatment alone. They were as follows:—

Name of Owner.	Weight. Lb.	Bullion extracted. Oz. dwt. gr.
R. Kelly, Tapu ... ..	22½	0 0 2
R. Kelly, Tapu ... ..	20½	0 0 1½
Argosy, Thames ... ..	45	14 13 0
H. P. Stark, Thames ... ..	120	3 10 0
Preece's Freehold, Coromandel ... ..	20	18 10 0
L. Wilson, Auckland ... ..	29	0 6 10
W. Marris, Thames ... ..	50	12 0 0*

\* Amalgam.

The following passed through the battery, but were not subjected to any treatment for the recovery of bullion beyond being assayed:—

J. R. Robinson, New South Wales: 250 lb. of sand, screened down to four grades, and each grade valued.

H. Lowe, Thames: 500 lb. of quartz in ten separate parcels. Separately crushed and sampled.

Hauraki Development Syndicate, Coromandel: (1) 600 lb., crushed, sampled, and assayed; (2) 550 lb., crushed, sampled, and assayed.

Union Beach: 1,500 lb. tailings, ground fine, concentrated, and assayed.

During 1897 ten Thames School of Mines students gained first-class mine-managers' certificates, and two gained battery superintendents' certificates. In January, 1898, I supervised another mine-managers' examination, for which there were twenty-three candidates. Fourteen of these were students at the Thames School, seven sitting for the mine-manager's and seven for the battery superintendent's certificate. The results of this examination are not yet published.

#### POSITIONS HELD BY FORMER STUDENTS.

The following table, showing the positions and salaries now held by former students of this school, will illustrate the practical benefit to be derived by following a course of mining instruction:—

APPOINTMENTS held by Students at the Thames School of Mines from its Inception to the 31st March, 1898.

—	Name.	Position.	Present Address (31st March, 1898).	Approximate Salary (per Annum).
1	B. Adams ..	Mine-manager, Imperial Gold-mining Company (London), Karangahake ..	Karangahake ..	£ 200
2	J. D. Colebrook ..	Mine-manager, Scotty's Extended, Coromandel ..	(Deceased) ..	250
3	M. Fleming ..	Mine-manager, Kirikiri Gold-mining Company, Thames ..	Auckland ..	..
4	W. Harris ..	Mine-manager, Mahakirau Gold-mining Company ..	Mercury Bay ..	250
5	M. Bruce ..	Mine-manager, Occidental Gold-mining Company, Thames ..	Thames ..	200
6	G. Violeau ..	Mine-manager ..	Coromandel ..	200
7	A. McNiel ..	Mine-manager, Matarangi Gold-mining Company ..	Coromandel ..	200
8	A. E. Argall ..	Mine-manager, Blagrove's Freehold (London) ..	Coromandel ..	250
9	T. Snow ..	Coal-mine manager, Ralph's Taupiri ..	Taupiri ..	250
10	W. Climo ..	Metallurgist ..	Wyalong ..	300
11	B. Hogg ..	Cyanide manager, New South Wales ..	New South Wales ..	350
12	H. Paltridge ..	Mine-manager ..	Port Darwin, Australia ..	250
13	E. J. Banks ..	Cyanide manager, Waihi Gold-mining Company (London) ..	Waihi ..	500
14	A. T. Day ..	Cyanide manager, Komata Reefs (London) ..	Komata, Thames ..	150
15	G. Heard ..	Cyanide manager, Victoria ..	Victoria ..	300
16	J. McPeake ..	Mine-manager, Barrier Reefs Gold-mining Company ..	Great Barrier ..	200
17	W. Eddowes ..	Mining engineer, New Zealand Exploring Syndicate (Limited) (London) ..	Thames ..	500
18	G. Peel ..	Metallurgist (chlorination-works) ..	Victoria ..	300
19	F. W. Linck ..	Mine-manager, New Zealand Exploration Company (Limited) (London) ..	Auckland ..	250
20	J. R. Robinson ..	Metallurgist, Royal Standard Gold-mining Company (London) ..	Wharekiraupunga ..	250
21	G. Truscott ..	Mine-manager, Charleston ..	Charleston ..	250
22	G. Warne ..	Mine-manager, Adelaide Gold-mining Company ..	Thames ..	250
23	J. McDermott ..	Mine Supervisor, Western Australia ..	Western Australia ..	500
24	M. Paul ..	Mine-manager, Kuranui-Caledonia (London) ..	Thames ..	350
25	J. A. Agnew ..	Mine-manager, Victoria Gold-mining Company, Thames ..	Thames ..	300
26	A. Carnie ..	Analyst, alcoholic liquors, Auckland ..	Auckland ..	150
27	W. Carpenter ..	Bank assayer, Paeroa ..	Paeroa ..	120
28	M. von Bernewitz ..	Assayer, Waihi Gold-mining Company (London) ..	Waihi ..	150
29	C. Ansley ..	Battery-manager, Big River Company, Reefton ..	Reefton ..	250
30	R. Mellett ..	Cyanide manager, Victoria ..	Victoria ..	350
31	T. K. Wilson ..	Cyanide manager, New South Wales ..	New South Wales ..	300
32	J. M. MacLaren ..	Instructor, Coromandel School of Mines ..	Coromandel ..	200
33	H. F. Shepherd ..	Mine-manager, Hauraki Associated Reefs Company (London) ..	Coromandel ..	350
34	W. Baker ..	Mine-manager, Thames Exploration Syndicate (London) ..	Thames ..	350
35	G. Steadman ..	Mine-manager, Britannia Gold-mining Company (London) ..	Coromandel ..	400
36	R. Tierney ..	Mine-manager, Sheridan Gold-mining Company ..	Tapu ..	250

2—C. 3.

APPOINTMENTS held by Students at the Thames School of Mines—*continued*.

—	Name.	Position.	Present Address (31st March, 1898).	Approximate Salary (per Annum).
37	T. Mangan ..	Mine-manager, Four-in-hand Gold-mining Company ..	Coromandel ..	200
38	T. Callan ..	Assayer, Waihi-Silverton Gold-mining Company (London) ..	Waihi ..	120
39	C. Taylor ..	Battery-manager, Talisman Gold-mining Company (London) ..	Karangahake ..	350
40	I. Thomas ..	Mine-manager, Thames Exploration Company (London) ..	Thames ..	250
41	A. Thomas ..	Mine-manager, Mahara Royal Gold-mining Company (London) ..	Tapu ..	250
42	T. James ..	Mine-manager, Waitekauri Company (London) ..	Waitekauri ..	250
43	F. Creighton ..	Mine-manager, North Island Exploration Company (London) ..	Great Barrier ..	250
44	F. Woolcock ..	Assayer, Waitekauri Union (London) ..	Waitekauri ..	150
45	J. Carter ..	Mine-manager, Bunker's Hill, Coromandel ..	(Deceased) ..	250
46	D. Laurie ..	Assayer, Te Aroha Gold-mining Company (London) ..	Te Aroha ..	150
47	F. Horne ..	Mine-manager, Phoenix Gold-mining Company, Whangamata ..	Coromandel ..	200
48	J. Banks ..	Cyanider, Waihi Gold-mining Company (London) ..	Waihi ..	150
49	G. Doveton ..	Assayer, Moanataiari Gold-mining Company (London) ..	Thames ..	150
50	G. Nicks ..	Bank assayer, Coromandel ..	Coromandel ..	150
51	A. Adams ..	Assayer, Tararu Gold-mining Company (London) ..	Thames ..	150
52	E. Cartwright ..	Mine-manager, Nonpareil Gold-mining Company ..	Thames ..	200
53	W. McGregor ..	Mine-manager, Chicago Gold-mining Company ..	Thames ..	250
54	G. Horne ..	Cyanide manager, Mariposa Gold-mining Company (London) ..	Kuaitunu ..	250
55	W. Horne ..	Mine-manager, Waitekauri ..	Waitekauri ..	250
56	J. H. Hodge ..	(Mine-manager) Water-race inspector, Thames ..	Thames ..	200
57	L. Wilson ..	Assayer ..	Auckland ..	150
58	J. H. McKenzie ..	(Mine-manager) Engineer for Marototo Company ..	Thames ..	200
59	G. H. White ..	Mine manager, Golden Point Company ..	Tapu ..	250
60	A. H. Thorpe ..	(Battery Superintendent) Cyanider, Waitekauri Cross (London) ..	Waitekauri ..	150
61	R. Clarke ..	Cyanider, Waitekauri Cross Gold-mining Company (London) ..	Waitekauri ..	150
62	A. Jones ..	Assayer, Mines Corporation (London) ..	Auckland ..	150
63	R. Ross ..	Mine-manager, Waitekauri ..	Waitekauri ..	200
64	J. H. Jackson ..	Assayer, Woodstock Gold-mining Company (London) ..	Karangahake ..	150
65	P. Callan ..	Assayer ..	Auckland (now at Thames) ..	..

## DISTRIBUTION OF PRIZES AND CERTIFICATES.

The annual distribution of prizes and certificates was conducted by Mr. James McGowan, M.H.R., in the school-building, a large number of students being present.

## GOVERNING BODY.

At the annual general meeting, held on the 8th February, 1898, the following officers and members of the Council were elected for the ensuing year: President, Mr. James McGowan, M.H.R.; Vice-president, Mr. T. A. Dunlop; members, Messrs. G. S. Clark, J. H. Smith, E. F. Adams, W. Burch, L. Melhose, M. Paul, G. Denby, R. James; Treasurer, Mr. J. H. Smith; Secretary, Mr. A. Bruce.

## WORK PERFORMED BY STUDENTS.

The following are some of the analyses performed by senior students in the laboratory:—

*Valuation of Specimen Stone. (H. E. Metcalfe.)*

Weight in air, 348 gr.; weight in water, 253 gr. Specific gravity of specimen = 3.66. Valuation: 5½ oz. of bullion per pound of stone. This was a rich sample of quartz from the Nonpareil, containing calcite.

*Analysis of Waihi Ore. (H. Metcalfe and W. Donovan.)*

SiO<sub>2</sub>, 68.9 per cent.; FeS<sub>2</sub>, 14.5 per cent.; CuS, 3.2 per cent.; PbS, 0.8 per cent.; FeS<sub>2</sub>FeAs<sub>2</sub>, 4.7 per cent.; Al<sub>2</sub>O<sub>3</sub>, 6.4 per cent.; Ag<sub>2</sub>S, 2.6 per cent.; 100.5 per cent. The stone was black in colour, and contained 760 oz. of silver and 24 oz. of gold per ton.

*Analysis of Sylvia Ore. (H. E. Metcalfe.)*

Pb, 66.5 per cent.; Cu, 3.4 per cent.; Fe, 8.7 per cent.; Zn, 1.3 per cent.; S, 20.4 per cent.: 100.3 per cent.

*Analysis of Coal. (H. E. Metcalfe.)*

Fixed carbon, 41.6 per cent.; volatile hydrocarbon, 6.4 per cent.; moisture, 3 per cent.; ash (reddish), 49 per cent.: 100 per cent. This was a sample of coaly matter found in the deep levels of the Kapanga Mine, Coromandel.

*Copper-ore, Hen and Chickens. (E. J. Banks.)*

Copper, 3.2 per cent.; iron, 38.2 per cent. This sample was chiefly sulphide of iron. It contained 3½ dwt. of gold and 4½ oz. of silver per ton.

*Analysis of Coal, Taranaki. (E. J. Banks.)*

Fixed carbon, 50.16 per cent.; hydrocarbon, 33.64 per cent.; moisture, 10.20 per cent.; ash, 6 per cent.: 100 per cent. Evaporative-power, 6.5; coke, 11.23 cwt. per ton. Remarks: Black

friable coal, lustrous; does not soil the hands; does not swell up on heating; dark-brown streak; ash white. Sulphur, 0.5 per cent.

*Analysis of Hikutaia Rock. (E. J. Banks and H. Croucher.)*

SiO<sub>2</sub>, 64.20 per cent.; FeO, 7.46 per cent.; Al<sub>2</sub>O<sub>3</sub>, 10.69 per cent.; MgO, 6.21 per cent.; CaO 2 per cent.; MuO<sub>3</sub>, 0.56 per cent.; Na<sub>2</sub>O, 3.93 per cent.; K<sub>2</sub>O, 1.47 per cent.; moisture, at 100° C. 0.84 per cent.; loss on ignition, 2.66 per cent.: 100.02 per cent. The rock was black in colour, partly decomposed, and greasy to the touch.

*Analysis of Rock from Thames at Depth of 400 ft., in Deep Sinker. (W. A. MacLeod.)*

SiO<sub>2</sub>, 54.12 per cent.; Al<sub>2</sub>O<sub>3</sub>, 3.36 per cent.; FeO, 13.57 per cent.; CaO, 6.53 per cent.; MgO, 1.56 per cent.; K<sub>2</sub>O and Na<sub>2</sub>O, 2.74 per cent.; moisture, 10.74 per cent.; loss on ignition, 7.44 per cent.: 100.06 per cent. The sample was brown-red in colour, showed slickensided faces, was greasy to the touch, and appears to be a crushed andesite.

SYLLABUS OF INSTRUCTION.

The following is the syllabus of instruction followed during 1897-98:—

*General and Mining Geology.*—(Lecturer, the Director, Mr. F. B. Allen, M.A., B.Sc.)

*Physical Geology.*—The earth as a planet, its form and motions; geological climate; the atmosphere; ocean; solid crust; the interior of the earth.

*Dynamical Geology.*—Metamorphism; agencies modifying the crust of the earth—atmospheric, aqueous, chemical; weathering; sedimentation; classification of deposits—mechanical, aqueous, organic, and chemical; denudation and erosion.

*Structural Geology.*—Stratification; jointage; contortion; faults; conformity; unconformity; dip and strike; cleavage; metamorphic rocks; intrusive sheets, bosses, dykes, fissures; formation of quartz veins, lodes, and metallic deposits; dynamics of lodes; recovery of lost lodes.

*Geological Surveying.*—The practice of running natural sections; noting dip, strike, and inclination of strata and lodes; mapping geological formations; collection of mineral and rock specimens.

*Stratigraphical Geology.*—Classification of plants and animals; fossils; blending of species; geological record; the study of characteristic life; and distribution of formations from archæan to recent times, with special reference to the geology of New Zealand.

*Mineralogy and Blowpipe Determination.*—(Lecturer and Instructor, the Director.)

*Systematic Mineralogy.*—(1.) Physical properties of minerals, their hardness, specific gravity, &c. (2.) Optical properties—refraction, reflection, polarisation, lustre, phosphorescence. (3.) Chemical properties. (4.) The application of the blowpipe, colour-tests, &c. (5.) Isomorphism, pseudomorphism, and allotropy. (6.) Distribution and paragenesis of minerals. (7.) Classification of minerals—chemical, economic.

*Descriptive Mineralogy.*—(1.) Non-metallic division—carbon group, &c. (2.) Metallic division—a description of the principal ores of the common metals, and their New Zealand localities and modes of occurrence.

*Crystallography.*—(1.) The six systems, their axes, typical forms, modified forms, &c. (2.) Holohedral and hemihedral forms. (3.) Reading of faces.

*Mathematics.*—(Lecturer and Instructor, Mr. W. A. MacLeod, B.A., B.Sc.)

*Arithmetic* (including the simple rules).—Weights and measures (those bearing on mining and assaying), greatest common measure, least common multiple, vulgar fractions, decimal fractions, proportion, problems.

*Algebra* (Hall and Knight's Algebra).—The meaning and use of the various signs and symbols, the simple rules, greatest common measure, least common multiple, fractions, factors, symmetry, problems containing one unknown, simultaneous equations, quadratic equations, simultaneous equations with more than one unknown, problems involving quadratics and the use of several unknowns, practice in the use of formulæ and their transposition.

*Euclid.*—The first four books (Todhunter), including the definitions and axioms.

*Land- and Mine-surveying.*—(Lecturer and Instructor, the Director.)

Adjustments of theodolite, dial, level; chain and steel tapes; traversing with theodolite and dial; connecting survey with standard meridian; ranging lines; division of land; computation of areas by latitudes and departures; reduction of slope measurements; off-sets; chaining, computation of co-ordinates; balancing survey; plotting survey and off-sets; obstacles to alignment.

*Mine-surveying.*—Different methods of connecting underground with surface meridian; reduction; to reduce magnetic meridian to true meridian; conducting underground with theodolite and dial; correcting magnetic survey by method of back- and fore-sights;

—Equations; logarithms; plane trigonometry; solution of triangles; calculation of line; of distance from working-face to nearest point on boundary of lease.

—Recording levels; practice with level and staff; grading roads, tramways, and railways; and striking grades; calculation of contents of earthworks by prismoidal method with Abney or reflecting level.

*Mining, Applied Mechanics, and Hydraulics.*—(Lecturer, the Director.)

*Mining.*—Shafts—selection of site, size; modes of excavation in dry and wet rock, wet sand, and swamp; timbering of shafts; ladders; chambers—size, excavation, timbering; levels and drives—size, excavation, timbering; securing sets on inclines; modes of stoping, height, and timbering of stôpes; main passes—size, timbering, division; mullock passes—size, timbering, distance apart.

*Pumping and Pit-work.*—Pumps and engines used in metal-mining, force-pumps, plunger-pump, draw-lift, fixing pump-pieces, bearers, friction-rollers, V-bobs, balance-bobs, main rods, flat rods, clacks, buckets, bucket-rod, catches, staples, and glands; thickness of pipes; capacity of pumps.

*Ventilation.*—Atmospheric pressure, vapour density; ventilation of drives and underground workings by natural and artificial means; furnaces, water-blasts, fans; division of air-courses; noxious gases met with in metal- and coal-mines, their composition and detection.

*Explosives.*—Their use in quarries and mines, relative strengths, action, gases evolved, composition; charging bore-holes; firing explosives; quantity to be used.

*Hauling and Winding.*—Safety-cages; man-engines; strength of rope; strength of timbers.

*Water-power.*—Turbines, Pelton wheels, calculation of horse-power and flow of water from boxes and nozzles.

Text-book used: Gordon's "Mining and Engineering," 10s., Government Printer.

*Practical Assaying.*—(Lecturers and Instructors, the Director and Assistant.)

*Dry Assaying.*—(1.) The furnaces and appliances used in fire-assaying, with sketches. (2.) The fluxes, their properties and uses. (3.) The reducers and their reducing-powers. (4.) Fuels and other reagents, as salt, iron, sheet and granulated lead, glass-powder, &c. (5.) Preparation of pure silver for parting gold and silver. (6.) Preparation of nitric-acid solutions for parting. (7.) Preliminary assays of ores and bullion, their use and application. (8.) Volatility of gold and silver—the influence of different temperatures in different parts of muffle; also of time in muffle. (9.) The operation in fire-assaying—*a*, powdering the ore; *b*, sampling the dry pulp; *c*, preparing the charge; *d*, fusing the charge, and extracting the lead-button; *e*, cupelling the lead-button; *f*, weighing the bullion; *g*, parting and calculating the value of the bullion. (10.) Probable sources of error in fire-assaying. (11.) Keeping note-books and proper record of results. (12.) The assay of litharge and red-lead. (13.) The assay of gold- and silver-ores—*a*, in clean quartz; *b*, in pyritous quartz; *c*, in concentrates and tailings; *d*, in roasted ores; *e*, by amalgamation assay; *f*, by scorification assay. (14.) The retorting and melting of bullion. (15.) The refining of base bullion. (16.) The assay of bullion—*a*, weighing the assay; *b*, cupelling for base; *c*, adding pure silver for parting; *d*, rolling the "cornet"; *e*, parting the "cornet"; *f*, calculating the value. (17.) The calculation of results obtained in batteries from treatment of gold- and silver-ores. (18.) The assay of galena and cerussite; the valuation of lead, gold, and silver. (19.) The valuation of lead bullion. (20.) The assay of tin-ore (cassiterite).

Text-book: Park's "Laboratory Instructions in Assaying and Practical Chemistry," 7s. 6d.

*Wet Assaying.*—(21.) Operations—*a*, solution; *b*, crystallization; *c*, precipitation; *d*, filtration; *e*, decantation; *f*, washing; *g*, evaporation; *h*, distillation; *i*, ignition; *j*, sublimation; *k*, fusion; *l*, use of blowpipe; *m*, the use of spirit- and gas-lamps; *n*, the preparation of reagents and tests of purity, &c.; *o*, the preparation of fluxes; *p*, test-papers; *q*, the balance, weights, operations of weighing; *r*, preservation of platinum crucibles. (22.) The assay of iron-ores—*a*, gravimetric; *b*, volumetric. (23.) The assay of copper-ores—*a*, as oxide; *b*, as metal by electrolysis; *c*, volumetric; *d*, colorimetric. (24.) The assay of antimonite. (25.) The assay of bismuth glance. (26.) The assay of cinnabar. (27.) The assay of galena. (28.) The assay of zinc-ores. (29.) The assay of manganese-ores. (30.) The assay of nickel-ores. (31.) The assay of cobalt-ores. (32.) The assay of chromite of iron. (33.) The assay of arsenic-ores. (34.) The assay of silver-ores—*a*, volumetric; *b*, gravimetric. (35.) The valuation of specimens.

Text-book: Park's "Assaying and Practical Chemistry," 7s. 6d.

*Practical Chemistry.*—(Lecturer and Instructor, Mr. W. A. MacLeod, B.A., B.Sc.)

*Junior Class.*—(1.) Operations (these are the same as for wet assaying). (2.) The separation of the metals into groups. (3.) Qualitative tests for the different metals. (4.) The separation of silver, lead, mercury. (5.) The separation of copper, bismuth, arsenic, and antimony. (6.) The separation of iron and alumina, iron and zinc, iron and manganese, iron and chromium. (7.) The separation of calcium and magnesium. (8.) The separation of barium, strontium, and calcium. (9.) The separation of potassium and sodium. (10.) Qualitative tests for the acid-radicals (inorganic)—*a*,  $\text{H}_2\text{S}$ ,  $\text{HCl}$ ,  $\text{HBr}$ ,  $\text{HI}$ ; *b*,  $\text{HNO}_3$ ,  $\text{HClO}_4$ ; *c*,  $\text{HBO}_3$ ,  $\text{H}_2\text{CO}_3$ ,  $\text{H}_2\text{CrO}_4$ ,  $\text{HF}$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{H}_4\text{SiO}_4$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{AsO}_4$ .

(Lecturer and Instructor, the Director.)

*Senior Class.*—(1.) The estimation of chlorine. (2.) The estimation of sulphuric acid and sulphur. (3.) The estimation of phosphoric acid. (4.) The analysis of limestones and calcareous freestone. (5.) The analysis of coals, coke, charcoal, and shales. (6.) The analysis of barytes. (7.) The analysis of fluor-spar. (8.) The analysis of scheelite and wolfram. (9.) The analysis of rocks (including estimation of  $\text{K}_2\text{O}$  and  $\text{Na}_2\text{O}$ ). (10.) The analysis of fireclays. (11.) The analysis of soils. (12.) The analysis of complex sulphide ores. (13.) The analysis of milk. (14.) The analysis of waters. (15.) The analysis of bone-dust and bone-ash, with estimation of nitrogen. (16.) The analysis of guanos and apatite. (17.) The analysis of superphosphates. (18.) The estimation of alcohol—*a*, by weight; *b*, by volume. (19.) Volumetric analysis: The estimation of—

alkaline hydrates; alkaline carbonates, acids,  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ,  $\text{HC}_2\text{H}_3\text{O}_2$ ,  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ ; haloid salts,  $\text{HCN}$ ,  $\text{KCN}$ ,  $\text{I}$ ,  $\text{As}_2\text{O}_3$ ,  $\text{SO}_2$ . ( $\text{Na}_2\text{S}_2\text{O}_3 + 5\text{H}_2\text{O}$ ).

Text-book: Park's "Laboratory Instructions in Assaying and Practical Chemistry," 7s. 6d.

*Theoretical Chemistry*.—(Lecturer, Mr. W. A. MacLeod, B.A., B.Sc.)

*Principles of Chemistry and Chemical Philosophy*.—Atoms, molecules, vapour-density, quantivalence, chemical formulæ.

*The Elements*.—(1.) Their history, occurrence, preparation, properties, uses. (2.) Compounds of the elements, their history, preparation, properties, uses, &c.

*Metallurgy of Gold and Silver*.—(Lecturer, the Director.)

(1.) Ore-crushing and -pulverising machinery—*a*, rock-breakers; *b*, stamps; *c*, mills, rolls, &c. (2.) Metallurgy of gold—*a*, amalgamation on copper-plates, in pans, &c.; *b*, chlorination processes and operations; *c*, leaching processes (Cassels's, &c.). (3.) Metallurgy of silver—*a*, smelting and amalgamating ores; *b*, smelting—reduction with lead and fluxes; *c*, amalgamation in pans with mercury—use of chemicals; *d*, leaching with solvents—sea-water or brine, ammonia, sodium hyposulphite, alkaline cyanides; *e*, oxidizing and chloridizing roasting.

Text-books: Eissler's "Metallurgy of Gold and Silver"; Gordon's "Mining and Engineering."

*Physics*.—(Lecturer, the Director.)

Fundamental ideas of matter and energy; conditions of matter; gravitation; mechanical powers; sound; light; heat; magnetism; electricity; chemistry; physiology and health.

*Practical Astronomy*.—(Lecturer and Instructor, the Director.)

The ecliptic; equinoxes; meridians; longitude; latitude; altitude; declination; right ascension; azimuth; use of Nautical Almanac; polar distance; zenith distance; hour-angle; sidereal time; mean time; solar time; parallax; refraction; retardation; acceleration; convergency of meridian; determination of meridian by star and sun observations, by single altitudes and greatest elongation of circumpolar stars; use of star charts; calculation of hour-angle, azimuth, and altitude of celestial bodies for any time and place; determination of latitude by meridian altitudes; determination of time by star transits and sun observations.

*Mechanical Drawing*.—(Instructor, Mr. E. J. Williams.)

Use of scales; printing and lettering; outline drawing; shading; colouring; drawing to scale from copies and objects portions of machinery and woodwork, showing plans, elevation, and sections.

*Special Classes* are held for the instruction of candidates for the Government mine-managers', battery superintendents', and engine-drivers' certificates. First term—First Monday in February to 30th April; second term—9th May to 20th August; third term—9th September to 20th December. Registration of membership—10s. per annum; class fees—5s. per term for each subject taken up.

#### Scale of Charges for Public Assays and Analyses.

					£	s.	d.
Bullion assays	...	...	...	...	...	0	5 0
Assays of quartz, tailings, or concentrates	...	...	...	...	...	0	5 0
Examination and determination of rocks and minerals	...	...	...	...	...	0	5 0
Assay of lead- and tin-ores, each	...	...	...	...	...	0	5 0
" iron- and manganese-ores	...	...	...	...	...	0	10 0
" copper- and antimony-ores	...	...	...	...	...	0	10 0
" zinc-, mercury-, and bismuth-ores	...	...	...	...	...	0	10 0
" gold- and silver-ores, with parting assay	...	...	...	...	...	0	5 0
Analysis of limestone and calcareous freestone	{	complete	...	...	...	1	0 0
		partial	...	...	...	0	10 0
" coals and fuels, each	...	...	...	...	...	0	10 0
" rocks and soils	{	complete	...	...	...	2	0 0
		partial	...	...	...	1	0 0
" fireclays and slags	...	...	...	...	...	1	0 0
" manures	...	...	...	...	...	2	0 0
" waters	{	complete	...	...	...	3	0 0
		partial	...	...	...	2	0 0
" nickel-, cobalt-, and chrome-ores	...	...	...	...	...	0	10 0
" concentrates	...	...	...	...	...	1	10 0
" complex sulphide ores, &c.	...	...	...	...	...	1	10 0

#### Experimental Plant.

Reports of working tests of parcels of gold- and silver-ores, concentrates, and tailings, from 1 to 3 tons:—

(1.) By Cassel cyanide process: Wet- or dry-crushing—*a*, by percolation; *b*, by agitation. (2.) By amalgamated copper-plates. (3.) By amalgamation in pans: Wet- or dry-crushing—*a*, by raw amalgamation in charges; *b*, by Washoe process with chemicals (*a*, hot pan-amalgamation; *b*, after chloridizing roasting). (4.) Chlorination: Small barrel tests.

Cost of treatment (minimum charge): £5 per parcel not exceeding 1 ton; £3 per ton for tailings.

## WAIHI SCHOOL.

Mr. P. G. Morgan, M.A., Director of the Waihi School of Mines, reports as follows :—

I have the honour to state that I took charge of the newly organized School of Mines at Waihi on the 1st July, 1897. Classes were at once formed in the following subjects: Mining, surveying, mathematics, theoretical chemistry, practical chemistry, assaying, and mineralogy and blowpipe analysis, to which later on was added geology.

The following is a syllabus of the work done from the beginning of July to the end of the year :—

*Mining.*—(a.) Methods of breaking down mineral and rock. (b.) Explosives, how used: their composition and relative strengths. (c.) Opening out mineral deposits by means of quarries, adit-levels, and shafts. (d.) Exploitation of mineral deposits. (e.) Transportation of mineral—hauling and winding machinery.

*Surveying.*—Nature and use of logarithms; the trigonometrical ratios; solution of triangles.

*Mathematics.*—(a.) Arithmetic—the whole subject. (b.) Elementary algebra.

*Theoretical Chemistry.*—The non-metallic elements.

*Practical Chemistry.*—(a.) Qualitative tests for metals and acids. (b.) Separation of the metals.

*Assaying.*—(a.) Furnaces, materials, and appliances used. (b.) Assay of gold, silver, tin, lead, copper, and antimony ores. (c.) Problems and calculations.

*Mineralogy and Blowpipe Analysis.*—(a.) The six crystallographic systems. (b.) Physical, chemical, and optical properties of minerals. (c.) The blowpipe, how used: tests for simple minerals. (d.) Classification of minerals.

*Geology.*—(a.) Physical and dynamical geology. (b.) Classification and mode of formation of rocks. (c.) The geological periods.

The numbers attending each class were as follows: Mining, 30 students; surveying, 14; mathematics, 32; theoretical chemistry, 9; practical chemistry, 16; assaying, 28; mineralogy and blowpipe analysis, 11; geology, 13: total attendance at classes, 153.

The number of individual students was sixty, and the average attendance between forty-five and fifty. This number severely taxed our accommodation, especially in the assaying class, which was overcrowded.

Since the beginning of the present year forty-two students have enrolled, a number which is quite sufficient to keep me fully employed, especially seeing that the more important classes are held both morning and evening for the benefit of those students who work on three shifts. I am also giving those students who wish it an opportunity of working in the laboratory out of class hours. The necessity of supervision is taking up more and more of my spare time as the number of such students increases.

The school is now fairly well furnished with chemicals and apparatus, a considerable sum having been spent in this direction. The committee are procuring a theodolite, and when this arrives we shall be able to start a class in practical surveying.

Though our present accommodation is in a way sufficient, the erection of a second class-room and the enlargement of the assay-room would be a great boon to the school, as I could probably obtain sufficient assistance locally to enable me to arrange for extra instruction in the various classes, and a room would always be available in which the more advanced students could work by themselves.

Since the opening of the school a considerable number of assays and determinations of minerals has been made by me for the public. A beginning has been made in getting together a collection of minerals, a number of specimens having been collected by myself, whilst others have been donated by students and friends of the school. Several good specimens of gold-bearing quartz and other minerals have been received from the Mines Department, for which, on behalf of the school, I now express my thanks.

In conclusion, I may state my belief that the Waihi School of Mines has so far fully justified its existence, and is doing good work towards the technical education of those connected with mining and battery work in this district.

## COROMANDEL SCHOOL.

The following is the report of Mr. J. M. Maclaren, M.A., Director of the Coromandel School of Mines :—

I have the honour to report as follows on the work and progress of the Coromandel School of Mines during the first term of the year 1898 :—

The formal opening of the school took place on Monday, the 20th February. In the unavoidable absence of Captain Hodge, the Vice-president, Mr. A. T. Kenrick took the chair. There were about a hundred and fifty students and subscribers present. The chairman expressed the gratification he felt at the successful termination of their labours as a committee, and felt confident that the school would prove itself of great value to the community. He hoped full advantage would be taken of it, and mentioned that there would be a total membership of fifty at the opening of the various classes. Mr. W. Thomas, the secretary, read the financial statement, showing a healthy state of affairs. The total amount expended was £313, whilst there was a credit balance in hand of £113. The estimated expenses yearly would be at least £250, towards which the Government would contribute £100 a year. The committee had confidence that this amount would be raised locally. The Director then gave a succinct synopsis of the proposed work of the school. A special vote of thanks was accorded to Mr. A. T. Kenrick for the active interest he had taken in the school in the past, and more especially for his lengthened gratuitous services as instructor.

*Classes.*—The attendance has been gratifying in the extreme, the number of individual students having been sixty-three, divided among the various classes as follows: Mining, 32; field- and mine-

surveying, 30; mathematics, 30; geology, 14; mineralogy and blowpipe, 14; assaying, 21; theoretical chemistry, 16; practical chemistry, 16; mechanical drawing, 4: total attendances, 177. Number of individual students, 63.

*Mining and Surveying.*—These are the most popular of the subjects taught at the school, and are taken up by students who intend to qualify for a first-class mine-manager's certificate. Field classes in surveying are held every week. Finding that students working on the Tokatea were unable to attend these classes, I have made arrangements to hold the field-surveying class there every alternate Tuesday. Several of these supplementary classes have been held, with very satisfactory attendances.

*Mathematics.*—This class is conducted by Mr. A. J. Litten, who reports satisfactory progress. Mining students who are deficient in mathematical knowledge avail themselves largely of this class, which is arranged to meet their particular requirements.

*Assaying.*—This is generally the largest class in a school of mines, and the comparative paucity of members is evidence of the good work done in the class formerly carried on by Mr. A. T. Kenrick, of the Bank of New Zealand. The assay plant in connection with this class leaves nothing to be desired, and double the number of students could, on an emergency, be accommodated.

*Theoretical Chemistry.*—In this important subject, the basis of metallurgical science, considerable attention is paid to the principles underlying the science. Instruction is imparted by means of lectures, illustrated where possible by numerous experiments.

*Practical Chemistry and Laboratory Practice.*—This class is composed entirely of beginners in the subject, who have made very satisfactory progress indeed. So far, only the reactions of metals and acids and the separation of the metals into groups have been treated of.

*Geology.*—There are fourteen members of this class, which is the best attended of any of the classes, the average for each student for the whole term being nineteen attendances in twenty lectures. The lectures are illustrated by a splendid series of coloured lecture diagrams, the work of Mr. A. R. Hyatt, who has kindly placed them at my disposal. In future the lectures will also be illustrated by means of an optical lantern and some two hundred slides dealing with geological subjects. The first extended geological excursion for the year was held on the 23rd April. The s.s. "Falcon" was chartered, and the Cretaceo-tertiary series of rocks at Torehine visited and thoroughly examined. A collection of fossils was made, including *Ostrea wullerstorffii*, *Turritella*, sp., *Fusus*, sp., *Cucullæa*, sp., crinoids (*Pentacrinus stellatus* and others), and *Hemipatagus tuberculatus*. In addition to the foregoing, which have already been recorded, *Scalardia*, sp., and sharks' teeth (probably *Lamna huttoni*, Davis), were collected. I propose to hold similar excursions to places of geological interest at intervals throughout the year.

*Mineralogy and Blowpipe Determination.*—Instruction in this class is considerably facilitated by the use of the valuable mineral collection in the possession of the school, containing, as it does, over two hundred specimens of minerals and rocks.

*Petrology.*—This important branch of geology will be entered on as soon as students have acquired a fair rudimentary knowledge of geology and mineralogy. This class will treat of the preparation of mineral sections, their examination under the polarising microscope, the determination of the component minerals, nomenclature of volcanic rocks, and the photographing of sections, &c.

*Metallurgy.*—This class has been deferred to the second and third terms of the year for various reasons, the most important being that a knowledge of chemistry is essential to enable students to understand the chemical processes, and this knowledge can be partly gained during the first term.

*Mechanical Drawing.*—This class was commenced very late in the term under the supervision of the Rev. C. F. R. Harrison, M.A. The attendance, so far, has been somewhat disappointing, but I understand there are several intending students, who prefer to wait until the commencement of the second term.

In the foregoing classes, where not otherwise specified, the syllabus of lectures and instruction is precisely as at the Thames School of Mines.

No Saturday classes for school-children are held, and all students are adults except three. Of these three one only is under seventeen years of age.

*Laboratory.*—During the term several assays and analyses have been performed for the public, notably one for the Public Works Department, of water from Cadman's Creek, Coromandel. I append a copy of the report furnished.

*Analysis of Water from Cadman's Creek, Coromandel.*—This is a clear, colourless, tasteless water, depositing only a very minute quantity of sediment on standing. After boiling for some time it has a feebly alkaline reaction. The fixed salts or solids are very low, amounting to 7.28 gr. per gallon, made up of alkaline chlorides (principally sodic chloride or common salt), 4.6 gr. per gallon, and carbonate of lime, 2.4 gr. per gallon. It must be termed a very soft water, and is therefore eminently suitable for steam or manufacturing purposes. With regard to its suitability for domestic purposes, I find it requires 0.149 gr. of oxygen to oxidize the organic matter in 1 gallon of water. This is a somewhat high factor, and the water is therefore of only ordinary purity. It must, however, be remembered that the sample was taken towards the close of a long period of drought, and that water is then not so pure as at any other time of the year. This percentage of organic matter, though large, will not invalidate it as a potable water; the more so as I failed to discover any traces of albuminoid ammonia or other nitrogenous compounds, the presence of which in any quantity would have infallibly indicated contamination.

*Governing Body.*—The committee for the current year are as follows: President, Mr. J. McGowan, M.H.R.; Vice-presidents, Captain W. H. Argall, Captain Hodge; members, Messrs. A. T. Kenrick, And. Jamieson, J. B. Rockliff, A. E. Argall, A. W. Attwater, T. W. Rhodes; Hon. Secretary, Mr. William Thomas.

In conclusion, I have to express my appreciation of the ready support and co-operation the committee have always afforded me in forwarding the interests of the school.



## NELSON SCHOOL.

This is a school where pupils are taught mineralogy, assaying, and elementary chemistry by Mr. W. F. Worley, who reports as follows:—

I have to report as follows upon the work done in the Nelson School of Mines from the 31st March, 1897, to the 31st March, 1898:—

*Blowpipe Analysis Class.*

Thirty-three boys joined this class early in April, 1897, and most of them continued to work steadily and perseveringly till the end of March of the present year. For convenience in management the class was divided into two sections, an upper and a lower. Those boys who had had previous experience were placed in the upper section, whilst the new-comers were put into the lower section. The boys in the lower section met every Wednesday afternoon, those in the upper section meeting in the dinner-hour on Friday. The work attempted was similar to that of past years—namely, the testing by means of the blowpipe of the ordinary ores of commerce. By the end of the year those boys who had a two-years' course were able to identify with tolerable certainty ores of arsenic, antimony, bismuth, lead, tin, copper, chrome, iron, nickel, cobalt, manganese, zinc, and silver. They could also detect gold by panning.

Mr. John Tinlin, having offered £1 to provide two prizes for the two best boys in the upper section, that class was examined at the end of March last. Eleven boys were present at the examination. Six test substances were given to each boy, and one hour was allowed for testing. Harold Hounsell named them all ten minutes within the hour. Arthur Krahagen and Cecil Palmer tied, each naming correctly. To avoid the trouble of a further examination of these two boys a third prize was given by myself. The first prize was a blowpipe cabinet, the second prize (two of them) "The Prospector's Handbook." The interest shown by the boys in this work is very encouraging, and for their years they do well.

Last Christmas time seventeen of the boys were taken to the Champion Copper-mines. We stayed there three days, camping out, and made collections of all the important minerals in the neighbourhood. The iron, copper, and chrome collected at that time have since been tested in the blowpipe class.

*Assaying.*

There has been a steady run of assay work, but not so much as in the previous year. For the year ending the 31st March, 1898, twenty-seven assays were made, some of them being bulk-tests of 12 lb. or 14 lb. samples. The Weatherhead crusher, which was purchased by means of the Government grant, has proved extremely useful in testing these larger samples. It is not much good for coarse crushing, but does the fine grinding exceedingly well. By putting stone first through a Taylor's crusher and then through the Weatherhead crusher I am able to reduce 5 lb. of the hardest quartz to fine powder in a little less than an hour.

Only one of the above-mentioned assays calls for special mention, and that is the so-called platinum-ore from Takaka. For several years past some of this stone has come to me at intervals for assay, but the results have always been negative. Some time ago, however, Mr. Jacobsen, the owner of this ore, brought over to Nelson some bars of white metal which he declared to be chloride of gold. The metal was brought to me to be tested, and proved to be lead, with traces of iron in it. Mr. Jacobsen discredited my tests, and by promising large rewards succeeded in getting eighty persons to subscribe £1 each for the purpose of putting up a small furnace for reducing the chloride of gold. Feeling that the public were being misled by one much self-deceived, and knowing that he was using litharge freely in the treatment of his ore, I made it publicly known that the metal was lead, and that it came not from the ore, but from the litharge which was put in as a flux. The public generally accepted this view of it, but some still continued to believe in the untold wealth of the ore. As Mr. Jacobsen was unable to fulfil his promises of large sums of money to those who assisted him, the whole affair seemed to have died out, when a person visiting Nelson got some of the metal, sent it to Melbourne to be assayed, and reported 60 per cent. of platinum. Many persons immediately thought that Jacobsen was right. £1 shares went up to £10, and changed hands at that price. In the interests of the public I got some of the ore from one of the shareholders, tested it most thoroughly, published the tests in one of our newspapers (the *Colonist*), and reasserted most emphatically the impossibility of a precious metal being found in that ore. This prompt action had its effect, and for some time nothing has been heard of the mountain of platinum.

*Conclusion.*

Owing to slight indisposition through overwork no lecture-work was undertaken last year, but arrangements have been made for the delivery of three lectures during the coming winter. Considerable attention has been given to agricultural chemistry, and the results of some experiments in that direction have been forwarded to the Agricultural Department. Three young men are also studying agricultural chemistry under my direction.

## REEFTON SCHOOL.

The Director of this school (Mr. R. M. Aitken) reports as follows:—

I have the honour to report on the work done at the Reefton School of Mines during the past year ending the 31st March, 1898, which, I regret to say, is not so good as that of the previous year.

At the beginning of the year there was a very good attendance to the classes, and the assaying department was kept very busy with outside work. This, however, did not last, and it gradually went down, so as to bring our average for the year rather low.

The classes were kept going regularly throughout the year, but in the latter part were very

poorly attended; hence none of our students competed at the annual examinations. The irregularity in the attendance is, of course, largely due to the distance the mines are from the school, and the different shifts allowing some to attend only every other week.

Up to the end of 1897 no less than thirty-two students from the school have successfully passed the Government examinations for first-class mine-managers, twenty-four under the Mining Act and eight under the Coal-mines Act. Besides these, a great many have been successfully prepared for the engine-drivers' and other examinations. Five candidates sat at the last examinations for mine-managers, held in January, the results of which are not yet known.

In the laboratory 430 assays and analyses have been performed, which shows a decrease compared with the previous year. Besides these, a large amount of experimenting has been done with the cyanide process on the tailings from the different batteries on the field, and, as a result of these experiments, the process is now being successfully used at two different places. The decrease in the number of assays performed at the school is owing to some of the large companies here employing assayers at their mines. The want of a small testing plant as described in my last report has been very much felt, and I am quite sure it would be largely used, and would greatly increase the utility of the school. As I have been doing all the laboratory work and experimenting myself, this, together with the classes, has kept me fairly busy throughout the year. The smaller schools, such as at Brunnerton, Denniston, and Boatman's, were not visited.

The number of individuals attending the classes would be about thirty, and the following tabulated statement will show the attendance at the different classes:—

Subject.	Members.	Average Attendance.
Mining and mathematics	15	10
Surveying	14	10
Assaying and metallurgy	18	12
Theoretical chemistry	10	6
Practical chemistry	10	6

The work done at the classes is similar to that of previous years, as follows:—

*Practical Assaying and Metallurgy.*—This has been our principal class, and has been fairly well attended throughout the year. The instruction given is of great importance to those who wish to qualify as assayers or battery superintendents, and the class should be even better attended than it is. The students are instructed in the wet and dry methods of assaying; use and composition of fluxes, fuels, reagents, &c.; smelting; valuing and refining of gold and silver bullion; amalgamation, retorting, &c.; also in the various methods of extracting gold and silver from their ores, such as battery-work, amalgamation, concentration, cyaniding, and chlorination. Some of the students from this class intended to sit for the battery superintendents' examination, but were unable to do so, not having the practical experience at a battery with cyanide plant attached.

*Practical and Theoretical Chemistry.*—The two subjects are taken together, and the attendance has not been good. In theoretical chemistry the non-metallic elements were taken generally, together with the chemistry of gold, silver, and mercury. This class does not seem popular, although a knowledge of the subject is very necessary to all mining men. In practical chemistry instruction was given in the preparation of reagents and salts, testing for acids and metals, separation and detection of metals and mineral substances, besides assays and analyses by gravimetric and volumetric methods.

*Land- and Mine-surveying.*—The work in this class was nearly all theoretical. Very little practice could be given to students, owing to want of instruments. Instruction was given in chaining, tabulation of traverses, calculations of areas, heights, distances, plotting, levelling, and laying out roads and races. This class, I am afraid, will soon get smaller unless more practical work is done; but I hope to have the necessary instruments early this year. It is a subject of great importance to mining students, and has always been a popular class at the school.

*Mining and Mathematics.*—The instruction given in this class includes mining geology, strength of materials, timbering, pumping and pitwork, hauling and winding, ventilation, explosives, water-power, &c.; also logarithms and plane trigonometry. These two latter subjects are of great importance to the mining student, and are the first things taught to a new member. Those attending are mostly miners and those wishing to qualify as mine-managers or engine-drivers. The attendance is rather irregular, which retards the class greatly, and prevents a large amount of work from being done.

*Reefton School.*—There has been nothing done in the way of adding improvements to the school, as the necessary funds were not available. The preparation of all assay samples has to be done with pestle and mortar, and finely pulverised on the bucking-plate and muller. With large samples this work is very laborious, and takes up a great deal of time. I have had to refuse many large samples on account of not having the necessary appliances to reduce them. The school is still urgently in need of a good assay balance, as a great deal of careful work has to be done, and should inaccurate returns be given it would greatly injure the school. I trust that during the coming year the committee may be enabled to equip the school a little better, and to add a few of the most necessary improvements.

*The Laboratory.*—In this department 430 assays and analyses have been performed during the year, besides a large number of experiments with cyanide and chlorine. A large number of samples have been sent for qualitative analysis, the most of which is done free of charge. The tests are made up as follows: Fire-assays, 361; amalgamation tests, 14 (weight of stone, 280 lb.); bullion assays and smeltings, 23; analyses, 5; cyanide tests, 20; tin assays, 2; copper assays, 5. The fire-assays made at the school are never less than 1,000 gr. tests, except in the case of concentrates where the sample is rich. The following is a copy of a 1,000 gr. assay-table made out by myself for use in the school; it may be of some use to others:—

Weight in 1,000gr.	Assay per Ton.	Weight in 1,000gr.	Assay per Ton.	Weight in 1,000gr.	Assay per Ton.	Weight in 1,000gr.	Assay per Ton.	Weight in 1,000gr.	Assay per Ton.	Weight in 1,000gr.	Assay per Ton.	Weight in 1,000gr.	Assay per Ton.
Oz. dwt. gr.		Oz. dwt. gr.		Oz. dwt. gr.		Oz. dwt. gr.		Oz. dwt. gr.		Oz. dwt. gr.		Oz. dwt. gr.	
0-001	0 0 16	0-037	1 4 4	0-073	2 7 17	0-109	3 11 4	0-145	4 14 17	0-181	5 18 6		
0-002	0 1 7	0-038	1 4 20	0-074	2 8 9	0-110	3 11 20	0-146	4 15 8	0-182	5 18 21		
0-003	0 1 23	0-039	1 5 11	0-075	2 9 0	0-111	3 12 11	0-147	4 16 1	0-183	5 19 13		
0-004	0 2 15	0-040	1 6 3	0-076	2 19 16	0-112	3 13 4	0-148	4 16 17	0-184	6 0 5		
0-005	0 3 6	0-041	1 6 19	0-077	2 10 7	0-113	3 13 20	0-149	4 17 8	0-185	6 0 20		
0-006	0 3 22	0-042	1 7 10	0-078	2 10 23	0-114	3 14 11	0-150	4 18 0	0-186	6 1 12		
0-007	0 4 14	0-043	1 8 2	0-079	2 11 15	0-115	3 15 3	0-151	4 18 16	0-187	6 2 4		
0-008	0 5 6	0-044	1 8 18	0-080	2 12 6	0-116	3 15 19	0-152	4 19 7	0-188	6 2 20		
0-009	0 5 21	0-045	1 9 9	0-081	2 12 22	0-117	3 16 10	0-153	4 19 23	0-189	6 3 11		
0-010	0 6 12	0-046	1 10 1	0-082	2 13 14	0-118	3 17 2	0-154	5 0 15	0-190	6 4 3		
0-011	0 7 4	0-047	1 10 17	0-083	2 14 5	0-119	3 17 17	0-155	5 1 6	0-191	6 4 18		
0-012	0 7 20	0-048	1 11 9	0-084	2 14 21	0-120	3 18 9	0-156	5 1 22	0-192	6 5 10		
0-013	0 8 12	0-049	1 12 0	0-085	2 15 12	0-121	3 19 1	0-157	5 2 13	0-193	6 6 2		
0-014	0 9 3	0-050	1 12 16	0-086	2 16 4	0-122	3 19 17	0-158	5 3 5	0-194	6 6 18		
0-015	0 9 19	0-051	1 13 8	0-087	2 16 20	0-123	4 0 9	0-159	5 3 21	0-195	6 7 9		
0-016	0 10 11	0-052	1 13 23	0-088	2 17 12	0-124	4 1 1	0-160	5 4 12	0-196	6 8 1		
0-017	0 11 2	0-053	1 14 15	0-089	2 18 3	0-125	4 1 16	0-161	5 5 4	0-197	6 8 6		
0-018	0 11 18	0-054	1 15 7	0-090	2 18 19	0-126	4 2 8	0-162	5 5 19	0-198	6 9 8		
0-019	0 12 10	0-055	1 15 22	0-091	2 19 11	0-127	4 2 23	0-163	5 6 11	0-199	6 10 0		
0-020	0 13 1	0-056	1 16 14	0-092	3 0 2	0-128	4 3 15	0-164	5 7 3	0-200	6 10 16		
0-021	0 13 17	0-057	1 17 6	0-093	3 0 18	0-129	4 4 7	0-165	5 7 19	0-300	9 16 0		
0-022	0 14 9	0-058	1 17 21	0-094	3 1 10	0-130	4 4 22	0-166	5 8 11	0-400	13 1 8		
0-023	0 15 0	0-059	1 18 13	0-095	3 2 1	0-131	4 5 14	0-167	5 9 2	0-500	16 6 16		
0-024	0 15 16	0-060	1 19 4	0-096	3 2 17	0-132	4 6 5	0-168	5 9 18	0-600	19 12 0		
0-025	0 16 8	0-061	1 19 20	0-097	3 3 9	0-133	4 6 21	0-169	5 10 10	0-700	22 17 8		
0-026	0 17 0	0-062	2 0 12	0-098	3 4 1	0-134	4 7 12	0-170	5 11 1	0-800	26 2 16		
0-027	0 17 15	0-063	2 1 4	0-099	3 4 16	0-135	4 8 4	0-171	5 11 17	0-900	29 8 0		
0-028	0 18 7	0-064	2 1 19	0-100	3 5 8	0-136	4 8 20	0-172	5 12 9	1-000	32 13 8		
0-029	0 18 23	0-065	2 2 11	0-101	3 5 23	0-137	4 9 11	0-173	5 13 1	2-000	65 6 16		
0-030	0 19 14	0-066	2 3 3	0-102	3 6 15	0-138	4 10 3	0-174	5 13 16	3-000	98 0 0		
0-031	1 0 6	0-067	2 3 18	0-103	3 7 7	0-139	4 10 19	0-175	5 14 8	4-000	130 13 8		
0-032	1 0 22	0-068	2 4 10	0-104	3 7 21	0-140	4 11 11	0-176	5 15 0	5-000	163 6 16		
0-033	1 1 13	0-069	2 5 2	0-105	3 8 14	0-141	4 12 3	0-177	5 15 15	6-000	196 0 0		
0-034	1 2 5	0-070	2 5 17	0-106	3 9 6	0-142	4 12 18	0-178	5 16 7	7-000	228 13 8		
0-035	1 2 20	0-071	2 6 9	0-107	3 9 21	0-143	4 13 10	0-179	5 16 23	8-000	261 6 16		
0-036	1 3 12	0-072	2 7 1	0-108	3 10 13	0-144	4 14 2	0-180	5 17 14	9-000	294 0 0		

The amalgamation tests are only made on quartz containing free gold, and an assay of the tailings saved is made, so as to arrive at the true value of the stone. For good practical battery tests on quartz the method used is first to crush and amalgamate out the free gold, then concentrate down and make fire-assay of concentrates, and finally assay the tailings. The test on the concentrates will show if they are worth saving and treating by chlorination, and cyanide may be tried on the tailings if they contain sufficient gold. The cyanide process has been twice tried on this field without success; but, after a good deal of experimenting, I brought out a method of treatment and applied the same successfully on the Cumberland tailings, which are now being worked. Two students from the school are working this plant, and I am sure, with proper treatment, most of the tailings on the field can be worked by cyanide.

Most of the fire-assays made were on quartz samples and tailings from all parts of the district, principally from Beeton, Westport, Paparoa and Victoria Ranges.

*Annual Examinations.*—No students from this school sat for the annual examinations at the end of the year. This was partly owing to the irregularity of the classes at the latter part of the year.

The school is governed by a president, secretary, treasurer, and a committee of four. For classes the year is divided into two terms. The membership fee is 10s. per annum, and 5s. per term is charged to students for each class attended.

*Scale of Charges for Assays, &c.*

	£	s.	d.
Assay of gold- and silver-ores ...	...	0	5 0
tailings and concentrates ...	...	0	5 0
Bullion assays ...	...	0	5 0
Meltings, bullion ...	...	0	10 0
Amalgamation tests under 10 lb. ...	...	0	5 0
under 20 lb. ...	...	0	10 0
over 20 lb. ...	...	1	0 0
Cyanide tests, small ...	...	1	0 0
Assays of lead- and tin-ores ...	...	0	5 0
copper, iron, antimony, zinc, &c. ...	...	0	10 0
Analysis of limestones, coal, &c. ...	...	1	0 0
concentrates ...	...	1	10 0

In conclusion, I must thank all those who have assisted in carrying on the school in the past, and trust that the institution may receive more outside support during the next year.

#### OTAGO SCHOOL.

The following is the report of Professor G. H. F. Ulrich, F.G.S., the Director of the Otago School of Mines :—

I have the honour to submit the following report on the School of Mines regarding attendance of students, results of the annual examinations, of work done during the past session, and future requirements.

The attendance number of students was fifty—the largest since the establishment of the school. Forty-six of this number were regular students for the full course, while the other four only attended classes in one or more of the three special subjects—general geology, metallurgy, and assaying. The number of old students returning for continuing or completing their studies was twenty, and that of the new entries twenty-six. Amongst the old students returned were two who had devoted the previous year to practical mining-work, and one of the old students stayed away for the same purpose, though with the intention of returning next session. Of three other old students who did not come back, two have left the country, and one has given up the intention of going through the course. Two of the eight students who left last year on the completion of their studies—viz., W. A. MacLeod, B.A., and H. E. Stephens—had not been engaged for the stipulated twelve months' practical work in mines, but since submitted certificates of having fulfilled this condition, and became thus entitled to, and were on application each granted, the diploma of Associate in Mining.

The attendance of the different classes throughout the session by the forty-six regular students was very satisfactory, only a few having missed lectures. One of the old students was, unfortunately, compelled, through serious illness, to miss all the lectures after the midwinter vacation. As he is now getting restored to health he will, no doubt, continue his studies next session.

The present status of the forty-six regular students is as follows: Of the twenty-six new students, sixteen passed successfully through the first year's course, including three—one an M.A.—who, on account of previous passing in general university subjects, were enabled to attend the classes and pass in several special subjects of the second and third years' courses. The other ten new students failed in or did not attend mathematics, two failed besides in theoretical chemistry, and three in mining geology, and one did not attend general geology.

Nine students completed the second year's course, with the exception of two who failed in mineralogy, and one of these failed also in mathematics, the other in theoretical mechanics and practical physics.

Nine students—one of five, one of four, and seven of three years' standing—finished their studies during the past session and are leaving the school, having been successful in passing the examinations in all the subjects prescribed for two of the divisions—viz., of mining and assaying.

The following table shows the numerical attendance at all the classes and the results of the recent annual examination :—

Subjects.	Attendance.	Entered for Examination.	Result of Examinations.			
			First Class.	Second Class.	Third Class.	Failures.
General (University)—						
Mathematics ... ..	24	20	1	1	14	4
Theoretical mechanics ... ..	12	11	1	3	6	1
Theoretical physics ... ..	9	9	1	2	6	...
Practical physics ... ..	6	6	...	3	2	1
Theoretical chemistry ... ..	25	25	2	7	14	2
Practical chemistry ... ..	22	22	4	5	13	...
Quantitative chemical analysis ... ..	6	6	2	2	2	...
Theoretical biology ... ..	1	...	...	...	...	...
Special (School of Mines)—						
Mining, second course ... ..	20	20	3	12	5	...
Mining geology ... ..	26	26	3	8	12	3
General geology ... ..	26	26	8	13	5	...
Mineralogy ... ..	14	13	...	2	9	2
Petrography ... ..	7	7	...	3	4	...
General metallurgy ... ..	13	13	3	1	9	...
Special metallurgy ... ..	12	12	3	3	6	...
Assaying, first course ... ..	8	8	3	4	1	...
Assaying, second course ... ..	9	9	7	2	...	...
Blowpipe analysis ... ..	12	12	4	6	2	...
Applied mechanics ... ..	5	5	1	3	1	...
Surveying, first course ... ..	8	8	2	2	4	...
Surveying, second course ... ..	7	7	...	7	...	...
Model drawing ... ..	25	25	8	9	6	2
Practical plane geometry ... ..	25	25	13	8	2	2
Solid geometry ... ..	12	12	1	5	4	2
Machine drawing ... ..	12	12	12	...	...	...
Totals ... ..	...	...	80	111	127	19

On account of the large number of new students who required to take the evening class for "First aid," increased by several older students who had not taken this class before, the honorary secretary of the St. John Ambulance Association, Mr. W. L. Logie, very considerably arranged a special class for mining students, which was held in the large lecture-room of the Mining School. The attendance of this class was twenty-seven, and twenty-two of these passed the examination entitling them to receive certificates of "First aid."

The number of students who have to engage in practical work in mines during the vacation is forty-five, comprising nineteen second and third years' students and the twenty-six new ones who entered this year. Owing to this large increase as compared with former years, combined with the great depression in mining in the Hauraki Goldfields, where a considerable number found remunerative and instructive employment last year, it will be rather difficult for many to quickly secure working-places in this colony. Several have, to my knowledge, already departed for previously fixed places in mines in the Coromandel and Waihi districts, a number of others have found work in the Westport, Kaitangata, and Shag Point coal-mines, and two or three have promises of early employment in the quartz-mines of Preservation Inlet, but there are still a good number without any definite prospects, and I am afraid that, in order to secure work here, they will have to be satisfied with lower daily wages than those generally earned by students in former years. They would, in my opinion—as I told several—have better chances of obtaining remunerative work, and gain thereby more varied and extended mining experience, in the Australian Colonies, especially Tasmania, where at the present time a large number of copper, lead, and other ore mines are in a stage of active development, and miners not over-plentiful. A good example was set in this respect a few years ago by several students, who tried their luck in that colony, and easily found work in tin and other mines.

Grateful acknowledgments are due to the Union Steamship Company for granting this year, the same as the last, a liberal reduction in the price of return steamer-fares to students travelling for working purposes.

Regarding the number of students likely to attend the school next year a reliable forecast is scarcely possible, considering that, as our experience shows, but little reliance can be placed upon applications for entry long in advance of the session. For the bygone session, for instance, there were forty applicants on the list, but only twenty-six of these actually attended. As up to the present nine new intending students have sent in applications for admission to the Registrar, while, on the other hand, nine students who have finished their studies are leaving the school, and eleven old students (requiring to attend only one more session) and the twenty-six who have gone through the first year's course may with tolerable certainty be expected to return, the prospective attendance number for next year's session would turn out the same as for the past session—i.e., forty-six—not counting upon any additional applications for entry or the possible staying-away of any of those who have already applied. Without any increase in the attendance, however, the resources of the school regarding space, apparatus, collections, &c., will during next session not only be taxed to the utmost in the assaying, surveying, mineralogy, and petrography classes, but some additions as well as assistance will be necessary. Regarding the assaying classes, the two new furnaces erected during the midwinter vacation and the converting of one of the little rooms off the furnace-room into a small laboratory have enabled the lecturer, Mr. Stephens, to get through the session without the two assaying classes (first and second course), which have to go on concurrently, seriously interfering with each other. For next year's session, however, the number of students entitled to take these classes will be so much larger that more new furnaces, together with certain alterations in the arrangement of the working benches, as sketched out by Mr. Stephens and the Registrar, are indispensable. Mr. Stephens will also require an assistant demonstrator for properly carrying on the two classes, which together may count from twenty to twenty-five students. Another serious deficiency Mr. Stephens has for some time been labouring under in both the assaying and metallurgy classes is a lack of a variety of larger samples of raw ores of the principal metals, as silver, copper, lead, zinc, &c., as well as of such metallurgical products as matte, speiss, slags, &c. Mr. Wilkinson, from one of his journeys through the Australian Colonies some years ago, brought back with him a considerable supply of these necessities, and subsequently—during Mr. Fitzgerald's time—Mr. James Park, then Director of the Thames School of Mines, kindly presented us for the assay laboratory with a number of samples of refractory auriferous ores from the Hauraki Goldfields; but, owing to the larger number of students since, all this stock is now nearly exhausted, and the assaying classes cannot be efficiently carried on during next session without a further supply. As Mr. Stephens, on his present journey through Victoria, South Australia, and perhaps Tasmania, will have excellent opportunities of selecting and bespeaking the required samples, he intends availing himself of them, trusting in the Council authorising the purchase of the samples on his return. The expense to be incurred in this way would certainly be less, and the selection far more satisfactory, than if the supply were obtained from Europe or Australia on merely a written order.

With regard to the surveying classes, the lecturer (Mr. Begg) informed me that he thought he might be able to accommodate a theoretical class (first course) of not over fourteen to sixteen students in his present lecture-room. For a larger number the room would, however, be too small—so far as drawing and plotting surveys was concerned—and, as there was no other lecture-room suitable, the only way out of the difficulty would be the temporary use of the library. As to the practical class (second course), Mr. Begg considered that if its attendance exceeded seven or eight students the provision of another levelling instrument and theodolite could hardly be done without for efficient instruction in outdoor work. In my own classes of mineralogy and petrography, which will both have a larger attendance than last session, I could not possibly carry on without the assistance of a demonstrator, in the same way and at the same expense as the Council sanctioned for the past session. For the class in mineralogy a long-felt want is the provision of a good systematic collection of specimens of the principal metallic and earthy minerals, permitting easy

access and close examination to the students at any time between lectures, which is not well possible with the large collection in the Museum, to which they have hitherto had to take inadequate recourse. In the petrography class the students were during the past session much troubled not only with the rock-section grinding-machine—now nineteen years in use—frequently becoming unworkable on account of worn-out bearings, but proving also quite insufficient for the use of all. The provision of a new machine and a thorough repairing of the old one—which is practicable and could be done at moderate expense—are therefore necessary requirements.

The class in general geology was during the past session conducted by the lecturer, Dr. Don, with the same if not greater enthusiasm than in former years, and afforded the students both excellent instruction and pleasure, owing to Dr. Don having, at his own expense, provided the necessary gas apparatus and fittings, room-darkening arrangements, &c., for the use of limelight in connection with his fine optical lantern, arranged for illustration on the screen of some five hundred photographic slides of interesting geological features and phenomena in various parts of the world. His private outlay on all these appliances and apparatus has so far been over £80, and I feel it a duty to him to state that, owing to his fine illustrative mode of teaching general geology, students are greatly aided in a clearer understanding of many somewhat difficult parts of my much drier subject of mining geology. As in former sessions, Dr. Don made with his students three excursions for field instruction during the recent session, the first of which was to the Harbour Cone and Sandy-mount for the purpose of studying the volcanic rocks of these districts. During the second excursion of one day a visit was made to the Wairongoa mineral springs, and the highly interesting deposit of auriferous greensand in the vicinity of these springs underwent close examination; while on the return journey the party were conducted through Freeman's coal-mine, in the Green Island coal-measures. The third excursion of the class was to the Oamaru district, and extended over three days. During the first day, on the way to Oamaru, the Hampden beds, enclosing the celebrated Moeraki boulders, were visited; whilst the second day was devoted to an inspection of the recently discovered auriferous quartz reefs on the Balruddery Estate, about fifteen miles from Oamaru; and on the third day the party went out exploring the fossiliferous beds of the Devil's Bridge and the pitchstone and bedded volcanic tuffs of the Oamaru Cape. It needs scarcely to be pointed out that, whilst affording the students great enjoyment, these excursions are of special value to them on account of the interest created in and the practical instruction received by ocular demonstration of geological features and occurrences. Dr. Don, on behalf of himself and the students, expresses thanks to Mr. and Mrs. Reid, of Elderslie, for hospitality shown to them on the visit to Balruddery; to Mr. A. Thomson, proprietor of the Wairongoa springs; to Mr. J. Green, manager of Freeman's coal-mine, for kindly conducting them through his mine; and to Mr. Crombie, Stationmaster at Dunedin, for seeing their large party comfortably settled for the journey to Oamaru.

Through the appointment of Mr. F. B. Stephens, one of our distinguished past students, as lecturer in metallurgy and assaying, this department of the school has been well kept up to its past high level of efficiency, as Mr. Stephens, through practice for several years as metallurgical chemist and assayer for some of the largest gold-mining companies in the Transvaal, proved to be an excellent instructor in these branches; and, owing to the intimate connection of the positions he there occupied with the management of crushing and cyanide establishments—the latter, perhaps, the largest and most perfect at present extant—he not only thoroughly understands their construction, but is also specially qualified for instructing students in the best modes and ways of working the cyanide process under varying conditions regarding the nature of ores to be treated. In the construction of our testing plant he finds defects, and recommends improvements and alterations in several parts, as detailed in a letter to me as follows: “(1.) The battery as at present arranged is not by any means a good amalgamator. I should recommend the addition of amalgamated apron-plates and deep-drop ripples as you yourself suggested. (2.) The speeds of the pulleys have all been miscalculated, and will have to be altered. This is the most important matter, as the pump will not work at the low speed, and the engine is very much strained. (3.) A connection should be made from the top cyanide-solution vat to the pump for the purpose of priming it. (4.) The overflow from the berdan should be enlarged, as it runs on to the floor at present. (5.) The pipe-connections on the cyanide plant want altering to make the affair at all workable. (6.) A covering for the gas-engine is necessary, as the building is very dusty, and the bearings will soon become ruined.”

With the exception of a small lot of tailings treated by the cyanide process and the berdan close towards the end of the past session, the testing plant was not in request by the public for many months—quite in contrast to its nearly continuous employment during the previous year. The chief cause of this unsatisfactory state of affairs is, doubtless, the boom in gold-dredging enterprises, in consequence of which quartz-mining and prospecting for auriferous quartz reefs, for which testing of samples is nearly exclusively required, have suffered to a great extent. There is, however, another circumstance that certainly contributed to it—viz., the general opinion amongst Otago mining men that our charges for treatment are much too high. Mr. Stephens has, indeed, evidence that several parties, after ascertaining our charges (which are on a par with the Thames School of Mines), send their test samples to Sydney, New South Wales, where there is a Government testing plant, and that the treatment charges per ton there made, together with all expenses for transport, &c., came to less than our charges for treatment only would have come to for the same samples. It is therefore a matter for consideration by the mining committee of the Council whether our charges per ton might not, without loss, be so far reduced as to equalise them with the total expenses entailed by having samples tested in Sydney.

#### EXPENDITURE ON SCHOOLS OF MINES.

The following table shows the expenditure by the Government on Schools of Mines since their inauguration, exclusive of subsidies paid to the University of Otago towards the School of Mines in connection with that institution:—

Financial Years.	Subsidies towards the Erection of Schools of Mines, and Maintenance.	Chemicals and Apparatus, also Mineralogical Specimens supplied to Schools of Mines.	Scholarships.	Salaries of Teachers, and Travelling-expenses, &c.	Total Sums paid by the Department towards the Schools of Mines.
	£ s. d.	£ s. d.	£	£ s. d.	£ s. d.
1885-86 ...	...	36 19 9	...	1,223 9 10	1,260 9 7
1886-87 ...	257 16 6	409 1 4	...	2,716 9 3	3,383 7 1
1887-88 ...	253 15 9	253 14 1	...	1,714 9 6	2,221 19 4
1888-89 ...	42 10 0	6 12 9	...	1,139 4 1	1,188 6 10
1889-90 ...	142 2 0	181 14 10	...	716 3 10	1,040 0 8
1890-91 ...	217 6 6	54 8 0	...	620 9 9	892 4 3
1891-92 ...	181 14 0	...	...	689 5 9	870 19 9
1892-93 ...	312 3 4	...	...	670 1 0	982 4 4
1893-94 ...	197 0 5	...	...	858 19 4	1,055 19 9
1894-95 ...	390 0 0	45 10 10	...	773 17 8	1,209 8 6
1895-96 ...	820 0 0	...	50	849 3 0	1,719 3 0
1896-97 ...	352 14 11	58 18 6	100	834 12 8	1,346 6 1
1897-98 ...	1,089 18 6	29 19 9	100	780 19 0	2,000 17 3
Totals ...	4,257 1 11	1,076 19 10	250	13,587 4 8	19,171 6 5

The above statement shows the amount expended on the different Schools of Mines throughout the colony; but, in addition to this, the sum of £6,750 has to be added, as that has been paid to the School of Mines attached to the University of Otago, £500 being paid last year towards maintaining the school, which makes the total expenditure up to the 31st March last to be £25,721 6s. 5d. This expenditure has extended over a period of thirteen years.

### WATER-RACES.

#### WAIMEA WATER-RACE.

This race is now in good order, and water is supplied to this district and Callaghan's, but, as the Waimea channel is now completed, the connection with the middle branch claims is now being carried on. At Kelly's Terrace the drainage-tunnel is now 2,602 ft. in length, but, as the total length before this work can be utilised is 6,600 ft., it will be some time hence before the water-race can be used.

The following statement will show the receipts and cost of maintenance of the Waimea Race for the year ended 31st March last, together with the approximate quantity of gold obtained by those using water for working claims from that supply:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
1897.							
April .. ..	59 1 3	77 15 3	48 11 8	10 17 3	61	185	721 10 0
May .. ..	84 2 6	82 12 9	60 4 2	10 17 3	50	240	936 0 0
June .. ..	68 10 10	59 19 0	46 14 2	10 16 0	54	205	799 10 0
July .. ..	71 11 3	82 8 6	57 8 2	10 16 0	52	230	858 0 0
August .. ..	78 14 7	70 17 6	49 4 2	13 16 0	51	222	865 16 0
September ..	78 8 7	67 5 0	54 19 2	10 16 0	72	234	912 12 0
October .. ..	61 9 7	55 7 9	55 19 2	10 16 1	45	198	772 4 0
November ..	83 17 6	75 12 6	54 4 2	11 7 8	46	252	963 16 0
December..	56 8 9	37 18 6	64 4 2	12 7 7	45	175	682 10 0
1898.							
January .. ..	34 1 3	50 16 3	71 19 2	12 4 3	40	115	448 10 0
February .. ..	55 12 6	60 17 0	48 4 2	11 19 3	37	173	674 14 0
March .. ..	61 5 0	48 7 6	65 9 2	11 19 3	41	190	741 0 0
Totals .. ..	787 18 7	769 17 6	677 1 6	..	49.5 (average)	2,409	9,395 2 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £787 18s. 7d., as against £776 19s. 5d. for the previous year, while the cost of maintenance amounted to £677 1s. 6d., as against £669 6s. 3d. for the former year; thus showing an increase in the cost of maintenance of £7 15s. 3d., and also an increase in the value of the sales of water of £10 19s. 2d. from the previous year.

The average number of men employed in claims worked with water from this supply last year was 49.5, and the approximate quantity of gold obtained by them was 2,409 oz., representing a value of £9,395 2s. Deducting the value of the sales of water from the value of the gold obtained, it leaves the average earnings of the men to be £173 17s. 11d. per man per annum, or £3 6s. 10d.



per man per week. This cannot be taken as their net earnings, as the cost of pipes, tools, and timber required in working the claims has also to be taken into consideration. The value of free water given to open up claims and for working poor ground during the year was £100. This free water, however, is necessary, as the ground is becoming more expensive to work every year. The total cost of this water-race and branches up to the end of March last was £136,988 8s. 8d.

#### CALLAGHAN'S BRANCH WATER-RACE.

This race, since its completion, has been a great boon to the miners in this district, and has enabled them to work claims hitherto unprofitably worked through want of a proper supply of water. The following statement shows the receipts and cost of maintenance of this race, and also the quantity and value of gold obtained by those using the water:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.			Oz.	£ s. d.
April .. ..	11 0 0	11 0 0	11 10 0	..	5	20	78 0 0
May .. ..	11 15 0	11 15 0	10 0 0	..	5	21	81 18 0
June .. ..	22 0 0	22 0 0	10 0 0	..	6	45	175 10 0
July .. ..	.. ..	.. ..	10 0 0	..	..	..	.. ..
August .. ..	6 5 0	6 5 0	10 0 0	..	6	20	78 0 0
September .. ..	36 15 0	36 15 0	10 10 0	..	6	43	167 14 0
October .. ..	.. ..	.. ..	10 0 0	..	..	..	.. ..
November .. ..	13 15 0	13 15 0	11 10 0	..	10	42	163 16 0
December .. ..	.. ..	.. ..	10 0 0	..	..	..	.. ..
1898.							
January .. ..	28 10 0	28 10 0	10 0 0	..	10	49	191 2 0
February .. ..	.. ..	.. ..	10 0 0	..	11	75	292 10 0
March .. ..	42 0 0	42 0 0	11 15 0	..	11	75	292 10 0
Totals .. ..	172 0 0	172 0 0	125 5 0	..	7.37 (average)	315	1,228 10 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £172, and that the cost of maintenance was £125 5s. The average number of men employed was 7.37, and the gold obtained by them 315 oz., of the value of £1,228 10s. Deducting the value of the sales of water from the value of the gold will show the average earnings to have been £143 4s. 7d. per man for the year, or £2 15s. per week.

The total cost of this race up to the 31st March last was £6,027 15s. 6d.

#### KUMARA WATER-RACE.

This race still continues to supply water to a number of men, notwithstanding the area of rich ground is getting less every year. The known area of gold-bearing terraces that can only be worked with increased water-supply must be dealt with on a large scale, and, until a much greater supply of water is available, returns cannot be expected to continue in such a satisfactory manner as hitherto.

The Loop-line Dam is now raised, and capable of storing a considerable additional quantity of water. The No. 5 main tail-race is not yet completed, the difficulties met with in having wet and running ground to contend with has caused such lengthy delay in furthering the work. The amount paid in subsidising this work up to date has been £3,316 6s. 5d.

The amount expended on the race was—Loop-line Dam, £493 14s. 2d.; moving siphons, £208 12s. 6d.

The following statement shows the revenue derived from sales of water, and also the cost of maintenance, for the year ended 31st March, 1897:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April .. ..	243 11 2	314 1 6	183 5 4	157 15 9	77	405	1,579 10 0
May .. ..	240 5 1	277 14 0	134 4 3	134 4 6	73	390	1,521 0 0
June .. ..	204 19 1	155 1 2	167 17 10	171 14 3	66	265	1,033 10 0
July .. ..	210 11 1	150 0 0	152 2 7	219 3 6	62	345	1,845 10 0
August .. ..	266 15 6	215 12 6	160 11 6	240 5 1	71	445	1,735 10 0
September .. ..	147 4 8	246 10 0	138 8 2	153 10 8	70	245	955 10 0
October .. ..	298 9 10	318 18 4	175 14 1	138 0 3	76	505	1,969 10 0
November .. ..	213 1 9	377 5 6	175 8 6	112 16 8	76	374	1,458 12 0
December .. ..	255 19 11	66 0 0	133 9 7	154 3 7	76	470	1,833 0 0
1898.							
January .. ..	208 16 2	190 0 10	128 19 7	171 1 9	74	375	1,462 10 0
February .. ..	415 13 9	199 0 0	139 7 10	389 11 1	70	556	2,168 8 0
March .. ..	185 15 3	252 0 0	151 10 9	321 14 3	71	345	1,345 10 0
Totals .. ..	2,889 8 3	2,762 3 10	1,841 0 0	..	71.83 (average)	4,720	18,408 0 0



It will be seen from the foregoing statement that the value of the sales of water for the past year amounted to £2,889 8s. 3d., as against £3,502 17s. for the former year, and that the cost of maintenance was £1,841, as against £1,786 15s. 9d. for the previous year. This shows a decrease in the revenue last year of £613 13s. 9d., and an increase in the cost of maintenance of £54 4s. 3d. In addition to the sales of water, the value of free water supplied to the claims which did not prove payable to work during the year amounted to £613 0s. 6d. The average number of men employed in claims worked with water from this supply was 71·83, and the approximate quantity of gold obtained by them was 4,720 oz., representing a value of £18,408. Deducting the value of the sales of water from the approximate value of gold obtained, it leaves £15,518 16s. 9d. as the earnings of the miners, which is equal to an average of £216 0s. 11d. a man per annum, or £4 3s. 0½d. per man per week. The total cost of this work up to the end of March last amounts to £42,166 2s. 8d., and, deducting the cost of maintenance from the value of the sales of water for the year, it leaves a profit on the working of £1,048 3s. 3d., which is equal to 2·485 per cent. on the total cost of the works.

[For table showing result of working Kumara Water-race for fifteen years, see page 25.]

#### WAIMEA-KUMARA WATER-RACES.

The Waimea and Kumara Water-races have been considered as separate races, though this is not the case. The object of showing each separately is to give an idea of the value of each in proportion to the capital expended on the different works in connection with each branch. They may be termed separate water-races, but the supply of water to the Kumara branch is dependent to a great extent on the Waimea branch. If these races were held by different individuals there would be a far greater scarcity of water at Kumara than now occurs, and at the same time there would be more water in the Waimea Race than could be disposed of. However, when the deviation of the Waimea Water-race is completed, and the branch constructed to Goldsbrough, the whole of the water in that supply will be utilised at Callaghan's and the middle branch, and it will only be when there is surplus water in the Kawhaka Creek that there will be a full supply in the Kawhaka Race feeding the Loop-line Dam, which stores the water for the Kumara field. The whole of these water-races are under one management, and worked as one concern. The following statement will show the revenue and expenditure on the whole of these works for the year ending the 31st March last:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April .. ..	313 12 5	402 16 9	243 7 0	168 13 0	143	610	2,379 0 0
May .. ..	336 2 7	372 1 9	204 8 5	145 1 9	128	651	2,588 18 0
June .. ..	295 9 11	237 0 2	224 12 0	182 10 8	126	515	2,008 10 0
July .. ..	282 2 4	232 8 6	219 10 9	229 19 6	114	565	2,203 10 0
August .. ..	346 15 1	292 15 0	219 15 8	251 1 1	128	687	2,679 6 0
September .. ..	262 8 8	350 10 0	203 17 4	164 6 8	148	522	2,035 16 0
October .. ..	357 19 5	374 6 1	241 13 3	148 16 4	121	703	2,741 14 0
November .. ..	310 14 3	466 13 0	241 2 8	124 4 4	132	668	2,605 4 0
December .. ..	312 8 8	108 18 6	207 13 9	166 11 2	121	645	2,515 10 0
1898.							
January .. ..	271 7 5	269 7 1	210 18 9	183 6 0	124	539	2,102 2 0
February .. ..	471 6 3	259 17 0	197 12 0	401 10 4	107	729	2,843 2 0
March .. ..	289 0 3	342 7 6	228 14 11	333 13 6	123	610	2,379 0 0
Totals .. ..	8,849 1 10	8,704 1 4	2,643 6 6	..	126·25 (average)	7,444	29,031 12 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £3,849 1s. 10d., while the expenditure for maintenance for the same period was £2,643 6s. 6d. For the previous year the value of the sales of water was £4,322 11s. 5d., and the expenditure £2,481 17s. This shows that there was a decrease in the revenue last year to the extent of £473 9s. 7d., while the cost of maintenance has increased to the extent of £161 9s. 6d.

The total value of free water given to the miners to open up new ground and construct new tail-races, and also for working claims which did not prove payable, amounted for the past year to £448 2s. 5d. The number of men employed in claims worked with water from these supplies was 126·25. Deducting the value of the sales of water from the approximate value of the gold obtained from claims worked with water from these supplies, which amounted to 7,444 oz., representing a value of £29,031 12s., it leaves £25,182 10s. 2d. as the average earnings of the miners, which is equal to about £199 9s. 3d. per man per annum.

The total cost of the whole of these works, including the cost of acquiring Wylde's Water-race—£790 9s. 4d.—up to the 31st March last was £186,825 9s. 3d.

31st March, 1898.

Water supplied.	Value sold.	Total Value Free for Assistance.	Total Value Free for Deviations.	Total for Construction of No. 3 Channel.	Total Value Water supplied.	Average Number of Sluice-heads supplied Daily.	Expenditure.
	d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		£ s. d.
Water sold	11						
Free ..	11	1,886 2 1	..	..	..	..	..
		..	..	..	9,782 17 0	46.85	2,158 5 5
Water sold	2						
Free ..	2	780 14 2	..	..	..	..	..
		..	..	..	10,485 2 4	49.92	1,656 0 1
Water sold	8						
Free ..	8	221 3 3	..	..	..	..	..
		..	..	..	10,009 19 10	57.20	1,454 19 5
Water sold	4						
Water sold	4						
Free ..	4	1,547 18 11	..	..	..	..	..
		..	..	..	8,018 13 3	56.19	1,898 18 10
Water sold	3						
Free ..	3	347 6 5	..	..	..	..	..
		..	..	..	7,516 16 8	53.68	982 12 0
Water sold	10						
Free ..	10	492 0 0	227 0 0	..	..	..	..
		..	..	..	7,435 6 10	58.10	1,024 1 9
Water sold	8						
Free ..	8	896 2 6	465 0 0	..	..	..	..
Free, No. 3 Channel		..	..	1,492 2 10	..	..	..
		..	..	..	5,908 10 0	42.16	1,424 13 3
Water sold	8						
Free ..	8	409 5 5	798 0 5	..	..	..	..
Free, No. 3 Channel		..	..	913 18 4	..	..	..
		..	..	..	8,781 16 10	62.72	1,766 4 3
Water sold	0						
Free ..	0	996 4 5	418 3 4	..	..	..	..
		..	..	..	8,054 18 9	57.53	1,584 10 11
Water sold	9						
Free ..	9	444 15 8	398 7 8	..	..	..	..
		..	..	..	6,682 4 1	47.35	1,782 11 0
Water sold	7						
Free ..	7	1,306 0 3	39 4 4	..	..	..	..
		..	..	..	6,927 9 2	49.48	1,917 8 5
Water sold	9						
Free ..	9	1,054 12 8	40 0 0	..	5,741 12 5	41.01	1,976 17 7
		..	..	..	..	..	..
Water sold	3						
Free ..	3	1,129 19 4	..	..	..	..	..
Free, No. 4 Channel		..	..	382 15 0	5,569 5 7	39.78	1,943 8 7
		..	..	..	..	..	..
Water sold	0						
Free ..	0	479 9 0	..	..	..	..	..
Free, No. 4 Channel		..	..	138 17 6	4,116 8 6	40.41	1,786 15 9
		..	..	..	..	..	..
Water Sold	3						
Free ..	3	414 12 5	..	..	..	..	..
Free, No. 4 Channel		38 10 0	..	..	3,837 5 8	..	1,841 0 0
		..	..	..	..	..	..
	1	11,439 16 5	2,875 15 9	2,872 13 8	108,263 1 11	38.24	24,693 7 3



The following statement will show the receipts and expenditure for the last thirteen years ending the end of March last of the Waimea and Kumara Water-races:—

Waimea Race.				Kumara Race.			
Year.	Sales of Water.	Expenditure on Maintenance.	Net Profit.	Sales of Water.	Expenditure on Maintenance.	Net Profit.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
1886 .. ..	1,790 16 0	1,131 18 1	+ 658 17 11	9,788 16 8	1,459 19 5	8,328 17 3	
1887 .. ..	1,675 19 4	1,116 10 0	+ 559 9 4	6,470 14 4	1,398 18 10	5,071 15 6	
1888 .. ..	1,612 11 3	1,027 17 11	+ 584 18 4	7,169 10 3	982 12 0	6,186 18 3	
1889 .. ..	1,416 6 8	860 2 5	+ 556 4 8	6,716 6 10	1,024 1 9	5,692 5 1	
1890 .. ..	1,240 9 7	795 7 7	+ 445 2 0	8,550 4 8	1,424 13 3	2,125 11 5	
1891 .. ..	1,888 17 5	933 3 3	+ 455 14 2	6,665 12 8	1,766 4 3	4,899 8 5	
1892 .. ..	1,121 16 2	784 13 10	+ 337 2 4	6,645 11 0	1,584 10 11	5,061 0 1	
1893 .. ..	1,015 12 3	858 0 4	+ 157 11 11	5,789 0 9	1,782 11 0	4,006 9 9	
1894 .. ..	828 15 8	919 9 4	- 90 13 8	5,582 4 7	1,919 8 5	3,662 16 2	
1895 .. ..	988 0 7	1,061 9 4	- 73 8 9	4,646 19 9	1,976 17 7	2,670 2 2	
1896 .. ..	795 13 6	770 3 8	+ 25 9 10	4,106 11 3	1,943 8 7	2,163 2 8	
1897 .. ..	776 19 5	669 6 3	+ 107 13 2	3,502 17 0	1,786 15 9	1,716 1 3	
1898 .. ..	787 18 7	677 1 6	+ 110 17 1	2,889 3 3	1,841 0 0	1,048 3 8	
Totals .. ..	15,439 16 5	11,605 8 6	3,834 12 11	73,523 13 0	20,891 1 9	52,632 11 3	

This table shows that there has been a net profit derived from the working of the Waimea Race of £3,834 12s. 11d., and £52,632 11s. 3d. from the Kumara Race, for the above period.

#### MOUNT IDA WATER-RACE.

This race continues to furnish water sufficient to employ a large number of men. The usual work in maintaining the race has to be carried on in order that it may be kept open, as landslips and falls from the sides frequently fill it up. During the early part of the year three dams had to be refaced with sods, and a short pipe was introduced to replace a flume that was worn out, the timber becoming too weak for the weight to be sustained. This, with the cleaning-out of the race and widening four miles from Home Gully to Coal-pit Gully, entailed considerable expense, and added to the cost of maintenance.

The very dry summer, combined with the early disappearance of the snow, reduced the quantity of water to such an extent that only one sluice-head and a half was running in the race at the middle of March.

Four new elevating claims have been added to the number, and there are eight elevating plants now in use. The increased need of an extra supply is apparent, and the only known source of supply is that from the proposed reservoir at Eweburn, which has been ascertained to be practicable.

The following statement will show the revenue derived from sales of water, the cost of maintenance, and the approximate quantity and value of gold obtained by the miners using water from this race for the year ending 31st March last:—

Date.	Sales of Water.	Cash received.	Maintenance.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value.
	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April .. .. 1897.	134 3 5	134 3 5	116 12 8	78	280	..
May .. ..	104 7 7	107 1 8	89 8 8	72	273	..
June .. ..	115 9 2	119 9 2	84 14 8	60	220	..
July .. ..	49 3 11	49 3 11	87 10 5	55	150	..
August .. ..	14 12 6	20 16 9	334 7 8	20	45	..
September .. ..	195 9 1	196 10 7	136 8 8	69	306	..
October .. ..	232 14 10	244 14 10	91 14 8	70	345	..
November .. ..	214 1 0	214 11 4	96 2 8	71	406	..
December .. ..	149 6 1	149 6 1	87 3 8	67	400	..
January .. .. 1898.	74 4 4	74 4 4	88 14 8	64	210	..
February .. ..	48 3 0	48 3 0	79 12 8	54	120	..
March .. ..	64 4 0	67 7 1	92 7 8	51	130	..
Totals .. ..	1,395 18 11	1,425 12 2	1,384 18 9	61	2,885	11,107 5 0

It will be seen from the foregoing statement that the value of the sales of water last year amounted to £1,395 18s. 11d., as against £1,333 11s. 6d. for the previous year, which is an increase of £62 7s. 5d., while the expenditure on maintenance was £1,384 18s. 9d., as against £1,316 15s. 6d. for the previous year. The gain on the working last year was £11 0s. 2d. The approximate quantity of gold obtained from claims worked with water from this supply was 2,885 oz., representing a value of £11,107 5s.; and the number of men employed in these claims averages about 61. Deducting the value of the gold obtained from the value of the sales of water, it leaves £9,711 6s. 1d. as the earnings of the miners, which is equal to about £159 4s. a man per annum, or about £3 1s. 2d. a man per week.

#### BLACKSTONE HILL RACE.

This race is still used by a few men, and, although they cannot be said to be doing well, they manage to recover a considerable quantity of gold. During the year the race was repaired and side-trimmed. The tunnel on Johnstone's tail-race was also repaired where it crosses the road. The

usual clearing-out of the race was done in February, whilst the water was low, and it is now in good order.

The following statement will show revenue derived from sales of water, the cost of maintenance, the number of men employed, and the approximate quantity of gold obtained from those claims which are worked by the aid of this race :—

Month.	Sales of Water.	Cash received.	Maintenance.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value.
	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
1897.						
April .. ..	10 15 10	10 15 10	0 8 0	9	..	..
May .. ..	10 15 10	10 15 10	4 3 0	9	..	..
June .. ..	10 15 10	10 15 10	0 8 0	7	..	..
July .. ..	10 15 10	10 15 10	0 8 0	8	..	..
August .. ..	10 15 10	10 15 10	0 3 0	9	..	..
September .. ..	10 15 10	10 15 10	2 3 0	9	..	..
October .. ..	10 15 10	10 15 10	0 8 0	9	..	..
November .. ..	10 15 10	10 15 10	0 3 0	9	..	..
December .. ..	10 15 10	10 15 10	0 8 0	9	..	..
1898.						
January .. ..	10 15 10	10 15 10	0 8 0	9	..	..
February .. ..	8 1 11	8 1 11	19 13 0	9	..	..
March .. ..	10 15 10	10 15 10	3 7 0	9	..	..
Totals .. ..	126 16 1	126 16 1	30 10 0	8·75	160	616 0 0

It will be seen from the foregoing statement that the sales of water for the last year amounted to £126 16s. 1d., as against £115 19s. 3d. for the previous year, while the cost of maintenance was £30 10s., thus leaving a net profit of £96 6s. 1d. on the working of this water-race. The average number of miners employed in claims worked by the aid of this water-race was 8·75, and the approximate quantity of gold obtained by them was 160 oz., representing a value of £616. Deducting the value of the sales of water from the value of the gold obtained, it leaves £489 3s. 11d. as the earnings of the miners, which is equal to about £56 per man per annum. The total cost of this water-race was £1,036 16s. The net profit on the workings last year gave about 9·6 per cent. interest on the capital invested.

#### SUMMARY OF WATER-RACES.

The following statement will show the profits and losses of working the different water-races constructed and maintained by the Government for the last twenty years, and also the collateral advantages derived by the utilisation of the water from these races :—

Name of Water-race.	Value of Sales of Water, including Value of Gold obtained in Sludge-channel.	Expenditure.	Profit or Loss on Working.	Average Number employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.	Duty received on Gold obtained.	Total Profit or Loss, with Value of Gold Duty added.	Total Cost of Construction.
	£ s. d.	£ s. d.	£ s. d.	Men.	Oz.	£ s. d.	£ s.	£ s. d.	£ s. d.
<b>Waimea-Kumara Water-race and Sludge-channel.</b>									
Nineteen years ended 31st March, 1897 .. ..	147,680 2 7	88,779 5 6	58,900 17 1	126	266,760	1,005,718 4 3	20,728 0	79,628 17 1	..
Year ended 31st March, 1898 .. ..	3,849 1 10	2,643 6 6	1,205 15 4	126	7,444	29,031 12 0	..	1,205 15 4	..
Totals .. ..	151,529 4 5	91,422 12 0	60,106 12 5	..	274,204	1,034,749 16 3	20,728 0	80,834 12 5	208,790 7 5
<b>Nelson Creek.</b>									
Thirteen years four months ended 31st July, 1892 .. ..	17,577 0 7	15,415 7 1	2,161 18 6	52	32,943	126,049 17 0	3,269 16	5,481 9 6	90,722 10 8
<b>Argyle.</b>									
Thirteen years ended 31st March, 1895 .. ..	5,530 16 10	5,455 7 7	75 9 3	17	8,040	30,738 12 0	804 0	879 9 8	15,151 15 3
<b>Mount Ida.</b>									
Nineteen years ended 31st March, 1897 .. ..	25,194 1 0	28,522 6 9	3,328 5 9	..	50,322½	191,854 2 6	3,176 2	152 3 9	68,607 8 9
Year ended 31st March, 1898 .. ..	1,395 18 11	1,384 18 9	11 0 2	61	2,885	11,107 5 0	..	11 0 2	..
Totals .. ..	26,589 19 11	29,907 5 6	3,317 5 7	..	53,207½	202,961 7 6	3,176 2	141 3 7	68,607 8 9
<b>Blackstone Hill.</b>									
Four years ended 31st March, 1897 .. ..	492 8 11	41 15 0	445 13 11	7	872	3,882 19 6	..	445 13 11	1,036 16 0
Year ended 31st March, 1898 .. ..	126 16 1	80 10 0	96 6 1	8½	160	616 0 0	..	96 6 1	..
Totals .. ..	619 5 0	72 5 0	542 0 0	..	1,032	3,998 19 6	..	542 0 0	1,036 16 0
Grand totals .. ..	201,846 6 9	142,272 17 2	59,573 9 7	..	369,426½	1,398,498 12 3	27,977 18	87,551 7 7	383,808 18 1

\* Including £6,027 15s. 6d. cost of constructing extension to Callaghan's.

† Loss on working.

## GOLD- AND SILVER-MINING.

The great increase in the number of claims taken up during the year 1896-97 led to the flotation of many companies, both in New Zealand and in London. In consequence, many of those companies that attempted to open up new mines with insufficient capital have expended all their funds, and in a large number of instances the claims and holdings have been abandoned.

This has caused a considerable falling-off in the prosecution of mining operations during the past year, and the work done has not proved of the great advantage to the industry that was expected. Large amounts have been expended in prospecting and searching for reefs in places where the indication of the existence of gold-bearing quartz was absent. In other parts, where reefs were discovered with fair prospects of yielding payable quartz, works were carried on in development in a half-hearted manner, and in many instances of such questionable utility, that claims have been abandoned at a time when, had the expenditure been carried out in a more judicious manner, the results would probably have proved the existence of payable mines. The desire to erect machinery to test quartz before the mine developments warrant such expenditure, is a failing frequently attendant on gold-mining in different parts of the world, and it must be admitted that instances of this kind have tended to disappointment in the New Zealand goldfields during the past year.

The good work carried on by many of the mining companies in conducting operations on a sound and practical basis, with skilled and careful management, will, however, lead to the steady expansion of the industry, and to an increase in the number of payable mines.

The following statement of the quantity and value of gold entered for exportation during 1897-98 shows the continued importance attached to the industry:—

Name of District.	Year ended 31st March, 1897.		Year ended 31st March, 1898.		Increase for 1898.
	Oz.	£	Oz.	£	
Auckland .. .. .	98,876	358,231	108,490	401,602	14,614
Marlborough .. .. .	789	3,070	619	2,400	..
Nelson .. .. .	2,534	9,544	758	2,853	..
West Coast .. .. .	71,548	286,261	66,121	264,481	..
Otago .. .. .	88,166	358,636	75,504	304,862	..
Totals .. .. .	256,913	1,015,742	251,492	976,198	..

In the Auckland District there was an increase of 14,614 oz. of gold—from the Thames County, 73 oz., and from the Ohinemuri County, 26,617 oz. Coromandel County shows a decrease of 10,692 oz.; Piako County, 35 oz.; and Borough of Thames, 1,349 oz.

In the South Island, Marlborough showed a decrease of 170 oz.; Nelson, 1,776 oz.; West Coast, 5,427 oz.; and Otago, 5,421 oz.

The yield of gold is nearly equal to that of last year, the difference being a slight decrease compared with the returns for 1897. Most hopeful anticipations must be formed of a substantial increase in the value of the yield of gold for next year, consequent on the addition to quartz-crushing machinery and to the number of dredges and improved hydraulic appliances in the alluvial fields.

## QUARTZ-MINING.

The great impetus given to quartz-mining by the judicious expenditure of capital in the development of mines and erection of machinery, will show that many companies are now established on a sound basis, and the properties are most valuable investments. The profits to be derived will not probably be in some instances such as shareholders would wish, but it must be borne in mind that over-capitalisation is responsible to a large extent for a smaller rate of dividend than would have otherwise obtained.

The following list of companies outside the colony connected with New Zealand mining shows the vast interest taken in developing the industry:—

Name.	Locality in which Operations are being carried on.	Share Capital.	British Office.
Anglo-Continental Gold Syndicate (Limited)	General ..	£ 100,000	Austinfriars, London.
Anglo-New Zealand Mines Investment ..	" ..	100,000	54 and 55, London Wall.
Apakura Syndicate .. .. .	" ..	1,800	10, Bloomfield Street.
Aroha Gold-mines .. .. .	Aroha ..	100,000	30 and 31, St. Swithin's Lane.
Achilles Goldfields .. .. .	Otago ..	100,000	11, Poultry, E.C.
Blagrove's Freehold Gold-mining Company ..	Coromandel ..	62,500	97, Dashwood House, E.C.
Blue Spur and Gabriel's Gully Consolidated Gold Company	Otago ..	130,000	6, Great St. Helen's.
Britannia (Hauraki) Gold-mining Company ..	Coromandel ..	100,000	34 and 36, Gresham Street, E.C.
Collingwood Goldfields .. .. .	Collingwood, Golden Bay	150,000	46, Queen Victoria Street, E.C.
Colville Company .. .. .	Coromandel ..	7,500	7, Drapers' Gardens, E.C.
Consolidated Goldfields of New Zealand ..	Reefton ..	225,000	30, St. Swithin's Lane.
Coromandel Exploration Syndicate .. .. .	General ..	2,000	6, Great St. Helen's.
Cromwell Gold Company .. .. .	" ..	100,000	54, Old Broad Street, E.C.
Dolcoath Gold-mining Company (Hauraki Peninsula, New Zealand)	Coromandel ..	150,000	142 and 143, Palmerston Build- ings, E.C.
Dual Syndicate .. .. .	General ..	10,000	3, Clement's Lane, E.C.
East Hauraki Gold-mining .. .. .	Coromandel ..	100,000	Finsbury House.
Ethel Reef Gold-mining Company .. .. .	Te Aroha ..	120,000	Dashwood House E.C.

Name.	Locality in which Operations are being carried on.	Share Capital.	British Office.
		£	
Fame and Fortune .. .. .	Thames .. .. .	50,000	110, Cannon Street.
Glenrock Consolidated (Limited) .. .. .	General .. .. .	225,000	3, Queen Street, E.C.
Gloucester Gold-mining Company .. .. .	Thames .. .. .	120,000	Throgmorton House, E.C.
Golden Lead of Hauraki .. .. .	Coromandel .. .. .	100,000	Moorgate Court, E.C.
Golden Pah (Hauraki) .. .. .	" .. .. .	62,500	97, Dashwood House, E.C.
Goldfields of Hauraki Prospecting Syndicate .. .. .	General .. .. .	3,000	53, New Broad Street, E.C.
Goldfields of New Zealand .. .. .	" .. .. .	100,000	13, St. Helen's Place, E.C.
Gold Trust of New Zealand .. .. .	" .. .. .	100	4, Great Winchester Street, E.C.
Grey Consolidated .. .. .	Grey .. .. .	200,000	15 and 16, George Street, S.W.
Hauraki Gold-mining Company .. .. .	Coromandel .. .. .	40,000	97, Dashwood House, E.C.
Hauraki Associated Gold Reefs .. .. .	" .. .. .	100,000	Winchester House.
Hauraki South Gold-mining Company .. .. .	" .. .. .	90,000	7, Great Winchester Street.
Hauraki (Auckland) Goldfields Syndicate .. .. .	General .. .. .	10,000	30, Basinghall Street, E.C.
Hauraki East .. .. .	" .. .. .	150,000	6 and 7, Grocer's Hall Court, E.C.
Hauraki Golden Bay Mines .. .. .	" .. .. .	150,000	8, Old Jewry, E.C.
Hauraki New .. .. .	Coromandel .. .. .	150,000	3, Princes Street.
Hikutaia Gold Syndicate .. .. .	Ohinemuri .. .. .	15,000	Suffolk House, E.C.
Inkerman Combined Gold-mines .. .. .	General .. .. .	200,000	15 and 16, George Street, S.W.
Irene (Hauraki) Gold-mine .. .. .	Kuaotunu .. .. .	80,000	Dashwood House.
Island Block Gold-mining Company .. .. .	Otago .. .. .	60,000	4, Lombard Court, E.C.
Kapai-Vermont Gold-mining Company .. .. .	Kuaotunu .. .. .	150,000	1, St. Helen's Place, E.C.
Kapanga Gold-mining Company .. .. .	Coromandel .. .. .	250,000	97, Dashwood House.
Kathleen Crown .. .. .	" .. .. .	75,000	Dashwood House.
Kathleen Gold-mine .. .. .	" .. .. .	75,000	
Kauri Freehold Gold Estates .. .. .	General .. .. .	250,000	6, Drapers' Gardens.
Key of Komata .. .. .	Ohinemuri .. .. .	100,000	34 and 36, Gresham Street, E.C.
Komata Queen .. .. .	" .. .. .	75,000	Dashwood House.
Komata Reefs Gold-mining Company .. .. .	" .. .. .	50,000	97, Dashwood House.
Kuranui-Caledonian Gold-mining Company .. .. .	Thames .. .. .	175,000	20, Great Winchester Street.
London and New Zealand Exploration .. .. .	General .. .. .	100,000	Broad Street House.
London and New Zealand Finance Corporation .. .. .	" .. .. .	102,000	139, Cannon Street, E.C.
London and West Australian Exploration .. .. .	" .. .. .	270,000	1, Great Winchester Street.
London and West Australian Investment .. .. .	" .. .. .	100,000	Broad Street House.
Mahikirau Syndicate .. .. .	" .. .. .	20,000	3, Crown Court.
Mahara Royal .. .. .	" .. .. .	150,000	54, Old Broad Street.
Maori Dream Gold-mines, Tairua .. .. .	Tairua .. .. .	130,000	8, Old Broad Street.
Mariposa Gold-mines .. .. .	" .. .. .	100,000	8, Crown Court.
Maori Gold .. .. .	Tairua .. .. .	130,000	8, Old Jewry.
Maori Syndicate .. .. .	General .. .. .	10,000	Austinfriars Passage, E.C.
Maoriland Gold-mines .. .. .	" .. .. .	95,000	Dashwood House.
May Queen (Hauraki) .. .. .	Thames .. .. .	200,000	22, Austinfriars.
Melville's New Zealand Corporation .. .. .	General .. .. .	100,000	20, Great Winchester Street, E.C.
Mines Corporation of New Zealand .. .. .	" .. .. .	250,000	3, Princes Street.
Mines Corporation of New Zealand Deferred .. .. .	" .. .. .	5,000	
Moanatairi Gold-mining Company .. .. .	Thames .. .. .	200,000	110, Cannon Street.
Monowai Gold-mines .. .. .	Waiomo .. .. .	150,000	28, Renfield Street, Glasgow.
Montezuma Gold-mines .. .. .	Te Aroha .. .. .	30,000	15, Sergeant's Inn.
New Alburnia Gold-mining Company .. .. .	Ohinemuri .. .. .	180,000	Finsbury House, E.C.
New Hauraki Gold Properties .. .. .	Thames and Coromandel .. .. .	100,000	Dashwood House.
New Zealand and General Mining Syndicate .. .. .	General .. .. .	25,000	19A, Coleman Street.
New Zealand Crown Mines Company .. .. .	Ohinemuri .. .. .	200,000	30, St. Swithin's Lane, E.C.
New Zealand Exploration Company .. .. .	General .. .. .	125,200	30, St. Swithin's Lane.
New Zealand Goldfields .. .. .	" .. .. .	50,500	23, College Hill, E.C.
New Zealand Gold Share and Finance Company .. .. .	" .. .. .	" .. .. .	3, Newman's Court, Cornhill.
New Zealand Gold Share and Finance Company .. .. .	" .. .. .	" .. .. .	
New Zealand Jubilee Gold-mines .. .. .	Waitekauri .. .. .	125,000	20, Great Winchester Street, E.C.
New Zealand Consolidated .. .. .	General .. .. .	50,000	15, George Street.
New Zealand Mines Trust .. .. .	" .. .. .	200,000	11, Abchurch Lane.
New Zealand and Western Australia Syndicate .. .. .	" .. .. .	50,000	Portland House.
New Zealand Gold Investment .. .. .	" .. .. .	5,000	11, Abchurch Lane.
New Zealand Talisman .. .. .	Karangahake .. .. .	150,000	65, New Broad Street.
New Zealand Venture Syndicate .. .. .	General .. .. .	5,000	11, Abchurch Lane.
New Zealand and Globe Exploration .. .. .	" .. .. .	10,050	4, Great Winchester Street, E.C.
New Zealand Broken Hills Gold-mining Company .. .. .	" .. .. .	300,000	13, St. Helen's Place, E.C.
New Zealand Corporation .. .. .	" .. .. .	100,000	3, Laurence Pountney Hill, E.C.
New Zealand Finance Syndicate .. .. .	" .. .. .	10,000	32, Old Jewry, E.C.
New Zealand Joint-stock and General Corporation .. .. .	" .. .. .	150,000	Finsbury House.
New Zealand Minerals Company .. .. .	" .. .. .	250,000	3, Laurence Pountney Hill, E.C.
New Zealand Pioneers .. .. .	" .. .. .	10,000	46, Queen Victoria Street.
North Island New Zealand Prospecting Syndicate .. .. .	" .. .. .	50,000	9, St. Mildred's Court.
Norman Proprietary Gold-mines .. .. .	Waitekauri .. .. .	75,000	Bloomfield House, E.C.
North Kapanga Gold-mining Company .. .. .	Coromandel .. .. .	60,000	54, Old Broad Street, E.C.
Ohinemuri Syndicate .. .. .	Owharoa .. .. .	60,000	11, Abchurch Lane.
Otago Syndicate .. .. .	General .. .. .	20,025	30, St. Swithin's Lane.
O.P.Q. Waipori Gold-mines .. .. .	Otago .. .. .	150,000	3, Laurence Pountney Hill.
Peveril Gold-mines .. .. .	Coromandel .. .. .	80,000	27, Old Jewry.
Phoenix .. .. .	General .. .. .	200,000	3, Queen Street.
Preece's Point Proprietary (Hauraki) .. .. .	Coromandel .. .. .	100,000	Dashwood House.
Ravenscliff Mining Company .. .. .	General .. .. .	60,000	Winchester House.
Royal Oak of Hauraki .. .. .	Coromandel .. .. .	100,000	63 and 64, New Broad Street.
Scandinavian Gold-mines .. .. .	Hauraki .. .. .	110,000	3, Newman's Court.
Royal Standard Gold-mines .. .. .	Wharekirasupunga .. .. .	200,000	43, Threadneedle Street.
Scotty's Hauraki Gold-mining Company .. .. .	Coromandel .. .. .	100,000	63 and 64, New Broad Street.
Southern Star Gold-mines .. .. .	" .. .. .	75,000	63 and 64, New Broad Street.
Success Gold-mines .. .. .	" .. .. .	50,000	Dashwood House.
Taitapu Gold Estates .. .. .	Nelson .. .. .	175,000	9, St. Mildred's Court.
Tararu Creek Gold-mining Company .. .. .	Thames .. .. .	95,000	Dashwood House.
Thames Hauraki Goldfields .. .. .	" .. .. .	300,000	54, Old Broad Street.

Name.	Locality in which Operations are being carried on.	Share Capital.	British Office.
		£	
Tokatea Consols .. .. .	Coromandel ..	100,000	45 and 46, Broad Street Avenue.
Tokatea of Hauraki .. .. .	" ..	150,000	63 and 64, New Broad Street.
Triumph Hauraki Gold-mines .. .. .	" ..	100,000	Finsbury House.
Tui Gold-mines .. .. .	Tui Creek ..	100,000	8, Old Jewry.
Union Waihi Gold-mining Company .. .. .	Waihi ..	200,000	11, Abchurch Lane.
United New Zealand Exploration .. .. .	General ..	250,000	22, Austinfriars.
Victor Waihou Gold-mining Company .. .. .	Karangahake ..	170,000	63 and 64, New Broad Street.
Waihi Consolidated Gold-mines .. .. .	Waihi ..	200,000	39, Lombard Street.
Waihi Gold-mining Company .. .. .	" ..	160,000	11, Abchurch Lane.
Waihi Grand Junction .. .. .	" ..	150,000	18, Finsbury Circus.
Waihi Proprietary Company .. .. .	General ..	175,000	Bishopsgate Street House, E.C.
Waihi Silverton Extended .. .. .	Waihi ..	60,000	23, College Hill, E.C.
Waihi Gladstone .. .. .	" ..	100,000	8, Old Jewry.
Waihi New .. .. .	Thames ..	160,000	11, Abchurch Lane.
Waitaia Gold-mines .. .. .	General ..	100,000	82, Gordon Street, Glasgow.
Waitekauri Consolidated Gold-mines .. .. .	Waitekauri ..	120,000	Swan Chambers, E.C.
Waitekauri Central .. .. .	" ..	65,000	63, New Broad Street.
Waitekauri Cross .. .. .	" ..	100,000	19A, Coleman Street.
Waitekauri Extended .. .. .	" ..	130,000	63 and 64, New Broad Street.
Waitekauri Gold .. .. .	" ..	150,000	11, Abchurch Lane.
Waitekauri United .. .. .	" ..	150,000	Finsbury House, E.C.
Waitekauri Union Claims .. .. .	Hauraki ..	300,000	College Hill Chambers.
Whangamata Proprietary .. .. .	Whangamata ..	200,000	College Hill Chambers.
Woodstock .. .. .	Karangahake ..	150,000	6, Drapers' Gardens.

## NORTH ISLAND.

## PUHIPUHI MINING DISTRICT.

Operations in this district have not been carried on with much vigour, although attention is still directed to the quartz-workings. The following special claims are now held for mining purposes :—

ABSTRACT of LICENSES for SPECIAL CLAIMS issued from the Warden's Office at Whangarei, in the Puhipuhi Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Whangarei :—

Date of License	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
12/3/96	A. B. P. 94 2 12	Puhipuhi ..	III.	Hukerenui	Plymouth Rock ..	British Gold- and Silver-mining Co. (N.L.).
8/7/96	100 0 0	" ..	III.	"	New Puhipuhi ..	New Puhipuhi Gold-mining Co. (N.L.).
8/7/96	100 0 0	" ..	III.	"	Mikado ..	British Gold- and Silver-mining Co. (N.L.).
8/7/96	100 0 0	" ..	III.	"	Success ..	J. Harrison.
8/7/96	100 0 0	" ..	III.	"	Waimarie ..	Waimarie Gold-mining Co. (N.L.).
11/9/96	100 0 0	" ..	III.	"	Dr. Jim ..	Dr. Jim Gold-mining Co. (N.L.).
11/9/96	100 0 0	" ..	III.	"	Success Extended ..	J. Harrison.
23/12/96	100 0 0	" ..	III.	"	Utlander ..	George E. Alderton.
9/9/97	100 0 0	Puhipuhi State Forest	III.	"	Great Northern No. 1	David Nairn Shaw (Glasgow, Scotland).
9/9/97	100 0 0	Ditto ..	III.	"	Great Northern No. 2	Ditto.
9/9/97	96 0 0	" ..	III.	"	Great Northern No. 3	"
17/2/98	100 0 0	" ..	III.	"	Star of England ..	Montezuma Gold-mining Co.
17/2/98	100 0 0	" ..	III.	"	Star of England Ext.	Montezuma Gold-mining Co., Te Aroha.

Operations in this field have been almost nil during the past year. The owners of the British Company's Mine failed to induce any of the mining syndicates to advance funds to further work their claims, and two of them were surrendered. Another party has taken up the ground, but has not yet made a commencement towards carrying on further works, although two men have lately been prospecting near the surface. Several other claims that had been surrendered were again taken up by fresh owners, and from two of these areas—the Star of England Nos. 1 and 2—it is intended to send parcel of 100 tons of silver-bearing ore to be treated at the Montezuma thermo-hyperphoric plant at Te Aroha.

At Kauri Mountain matters have remained at a standstill, and, as far as can be learned, the prospects met with have not been of much importance.

## Ohaewai.

No further operations have been carried on in working the cinnabar and free mercury deposits near the hot springs.

## GREAT BARRIER ISLAND.

Mining operations have not been vigorously carried on. Many of the claims taken up have been entirely neglected, and the results from the chief mines so far have not proved of very great importance.

The following list shows the whole of the claims registered, and for which titles were in existence, at the end of the year :—



ABSTRACT of LICENSES for SPECIAL CLAIMS issued from the Warden's Office at Thames, in the Great Barrier Island, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar, Thames.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
30/11/96	A. B. P. 100 0 0	Great Barrier	VII.	Fitzroy ..	Aotea ..	Aotea Gold- and Silver-mines Co. (N.L.).
30/11/96	100 0 0	"	VII.	" ..	Aotea No. 2 ..	"
30/11/96	100 0 0	"	III.	Tryphena	Argyle ..	Iona Gold- and Silver-mining Co. (N.L.).
23/12/96	62 0 36	"	VII.	Fitzroy ..	Egerton ..	Alexander D. Robertson.
30/11/96	100 0 0	"	VI.	" ..	Fitzroy ..	Great Barrier Gold-mining Co. (N.L.).
30/11/96	100 0 0	"	VI.	" ..	Great Barrier Extended	Great Barrier Gold- and Silver-mining Co. (N.L.).
30/11/96	100 0 0	"	VII.	" ..	Great Barrier Extended	William Ernest Cossar.
30/11/96	100 0 0	"	VII.	" ..	Great Barrier Extended	Original Great Barrier Gold- and Silver-mining Co.
30/11/96	100 0 0	"	VII.	" ..	Iona ..	Iona Gold- and Silver-mining Co. (N.L.).
30/11/96	100 0 0	"	VI.	" ..	Kaitoke ..	Kaitoke Gold- and Silver-mining Co. (N.L.).
30/11/96	100 0 0	"	VI.	" ..	Kaitoke No. 2 ..	Kaitoke Gold- and Silver-mining Co. (N.L.).
30/11/96	100 0 0	"	VII.	" ..	Mount Argentum	Mount Argentum Gold- and Silver-mining Co.
30/11/96	100 0 0	"	VII.	" ..	Mount Argentum Extended	Mount Argentum Gold- and Silver-mining Co.
30/11/96	100 0 0	"	VII.	" ..	Premier of Great Barrier	Original Great Barrier Gold- and Silver-mining Co. (N.L.).

*Egerton.*

This mine is now being worked on option by the New Zealand Mines Trust. Several reefs are being opened up, but the operations so far have not been sufficient to prove the value of the property. The No. 4 drive, on what is called the "14 by 6" reef, has been extended 179 ft. The 2 ft. cross-reef is also being exploited, but at present it is smaller than usual. Paul's reef has been trenced on, and it maintains its size and looks well. The drive is being extended to cut the junction of the 6 ft. and other reefs, and it is expected that the reef at this point will show an improvement. Driving on a small leader in the hanging-wall is also being proceeded with, the operations being conducted under the superintendence of Mr. Richard Newdick.

*White Cliffs.*

The cross-cut has been extended a further distance of 11 ft., making 83 ft. in all, and the reef cut through. It shows a thickness of 2 ft., being well defined, and carrying good-looking mineral. Work has now been started on the western boundary of the original Great Barrier and White Cliffs property by means of trenching, with a view of intersecting a reef that has been worked by the former company with good results.

On the Barrier Gold and Silver Company's property the reef in the low level has been stripped 14 ft. in a westerly direction—that is, towards the Barrier Reefs boundary. Operations here have been suspended for the present, and the men are now working on the eastern end. Just at the boundary of the Fitzroy and Barrier Extended sections a reef 3 ft. wide is outcropping, and it is intended to put in a low level to intersect this lode, which, it is thought, may possibly prove to be the continuation of Lee's reef.

On the adjoining claim, the Barrier Reefs, the work of sinking the shaft is progressing satisfactorily, a depth of 137 ft. having been attained. The rock at the bottom is hard, and progress is somewhat slower in consequence. The low level is now in 39 ft., and the face is in harder country than that previously penetrated.

The Iona low level has been extended a total distance of 360 ft., 31 ft. having been driven during the last fortnight. The country is showing an improvement, the face now being in a nice grey sandstone.

On the Staffa ground operations have been temporarily suspended, absolute protection having been obtained. The future operations of this company will to a great extent depend upon the result of the development work in the Iona property, which should give a good indication to the Staffa company as to what work they should undertake.

On the Kaitoke property the number of men employed has been reduced, and the shareholders are to be called together to decide as to future operations. The point at which the reef should have been intersected in the low level has been passed, and the directors, before deciding as to the nature of future operations, have decided to consult with shareholders.

The Aotea and Original Great Barrier properties are being worked by the New Zealand and Johannesburg Syndicate, and the work previously described is being continued. The same remarks apply to the Great Barrier Gold and Silver Estates (over which the Melville Corporation have the option).

COROMANDEL DISTRICT.

This district, which comprises the most northerly portion of the Cape Colville Peninsula, includes the different goldfields from Port Charles to Manaia, as well as the Kuaotunu and Mercury Bay fields. Many of the claims taken up during the past two years have been surrendered and abandoned. The licenses consequently lapsed, or were forfeited for non-compliance with the condi-

tions under which they were held; whilst some of those claims in which prospecting operations were carried on in a practical manner continue to afford hopes of ultimate success. In other mines continued development work has been the means of discovering gold-bearing quartz, in the production of which the mining operations and after treatment furnished profitable employment for a large number of men.

The subjoined list of claims will show that the area of ground occupied is much less than formerly, although a considerable number have been taken up during the past year:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Coromandel, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Coromandel.

Date of License.	Area.		Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
8/11/97	A.	R. P.	Waikanae ..	V., VI.	Harataunga	Ackbar ..	Ackbar Gold-mining Co. (N.L.).
18/5/96	32	0 22	Matamata-harakeke	VI.	"	Ada ..	Enoch Richards.
18/5/96	100	0 0	Kennedy Bay	IX.	"	A.J.C. ..	A.J.C. Gold-mining Co.
10/7/97	100	0 0	"	II.	Coromandel	Akarana ..	Golden Butterfly Gold-mining Co. (N.L.).
25/6/96	86	0 0	Coromandel	VI.	"	Alameda ..	F. Swindley and H. C. Bell
5/11/96	20	0 0	"	V.	"	Albion ..	Hauraki Main Lodes (Ltd.).
20/11/95	78	3 37	"	"	"	Albion Extended ..	Hauraki Main Lodes (Ltd.).
29/10/95	30	0 0	Tiki ..	VI.	"	Alert ..	Alert Gold-mining Co. (N.L.).
10/7/97	100	0 0	Waikawau ..	IV.	Moehau ..	Antipodes ..	Adolph Kohn
10/7/97	95	3 27	" ..	"	" ..	Antipodes No. 2 ..	"
10/7/97	94	0 5	" ..	"	" ..	Antipodes No. 3 ..	"
18/5/96	99	3 20	Tokatea ..	II.	Coromandel	Arawa ..	S. W. Bedlington.
24/4/96	98	3 24	Mania ..	XIV.	"	Ballarat ..	James Edwards.
8/11/97	83	2 0	Kennedy Bay	IV.	Harataunga	Bay View ..	Bay View Gold-mining Co. (N.L.).
23/12/96	63	2 0	Matamata-harakeke	VI.	"	" ..	"
18/2/96	100	0 0	Coromandel	"	Coromandel	Beatrice ..	Hauraki Golden Bay Mine (Ltd.).
2/7/95	18	0 30	Tokatea ..	II.	"	Bismark Extended ..	J. H. Witherford.
21/8/95	38	1 8	" ..	"	"	Britannia ..	Britannia Hauraki Gold-mining Co. (Ltd.).
21/7/97	99	0 0	Mania ..	XIII.	"	British Fleet ..	George Houghton and Robert McShane.
5/8/97	98	0 0	Kikowhakarere	I.	"	British Kapanga Freehold Proprietary	James Halley.
5/8/97	60	0 0	"	"	"	Ditto Extended ..	"
27/8/95	2	0 12	Coromandel	V.	"	Bunker's Hill ..	Bunker's Hill Gold-mining Co. (Ltd.).
27/8/95	1	0 0	"	"	"	Bunker's Hill Extd.	"
24/4/96	96	0 0	Kennedy Bay	IX.	Harataunga	Cabbage Bay ..	Queen Victoria of Hauraki Gold-mining Co.
30/11/96	85	0 0	Coromandel	VI.	Coromandel	Cadman's Gully No. 1	W. H. Cooper.
11/10/97	40	2 0	Kennedy Bay	IX.	Harataunga	Cadman Extended ..	William McFarlane.
21/2/98	90	0 0	"	VII.	Coromandel	Castle Rock Consolidated No. 1	Kauri Freehold Gold Estates (Ltd.).
21/2/98	90	0 0	"	"	"	Ditto No. 2 ..	"
21/2/98	90	0 0	"	"	"	" No. 3 ..	"
21/2/98	90	0 0	"	XI., VI.	"	" No. 4 ..	"
21/2/98	90	0 0	"	VII., XI.	"	" No. 5 ..	"
21/2/98	90	0 0	"	"	"	" No. 6 ..	"
21/2/98	90	0 0	"	XI.	"	" No. 7 ..	"
21/2/98	90	0 0	"	"	"	" No. 8 ..	"
21/2/98	90	0 0	"	"	"	" No. 9 ..	"
10/7/97	100	0 0	Tiki ..	X.	"	Charley Beresford ..	Hugh Arthur Bishop.
6/2/97	74	0 0	Mania ..	XIII.	"	Childwell Hall ..	John McNeil.
23/3/97	6	1 9	" ..	"	"	City of Lucknow Surplus	Percy A. Vaile.
23/8/97	12	0 0	Tiki ..	VI.	"	Colleen Bawn ..	John Fitzgerald.
2/3/98	28	3 3	" ..	XII.	"	Colorado ..	William Whitaker.
10/7/97	52	2 16	Tiki ..	X.	"	Condor ..	Jackson Palmer.
12/1/98	14	3 22	" ..	II.	"	Conquering Hero ..	Conquering Hero Gold-mining Co. (N.L.).
7/10/96	86	0 0	Tokatea ..	"	"	Coronet ..	Coronet Gold-mining Co. (N.L.).
2/11/96	63	2 24	Coromandel	VI.	"	Coromandel Queen ..	Coromandel Queen Gold-mining Co.
15/12/97	63	3 2	"	II.	"	Cornubia ..	William Brentnall.
7/6/97	73	0 0	Waikawau ..	III.	Harataunga	Cousin Jack ..	Ernest Brothers Dufaur.
25/5/97	70	0 24	Waikanae ..	V.	"	Crown's Hill ..	Ackbar Gold-mining Co. (N.L.).
14/4/96	30	0 0	Tokatea ..	II.	Coromandel	Cuirassier ..	Cuirassier Gold-mining Co. (N.L.).
1/9/96	14	3 21	" ..	"	"	Cuirassier Surplus ..	"
11/8/96	52	2 9	Matamata-harakeke	VI.	Harataunga	Cuvier Light ..	Cuvier Light Gold-mining Co. (N.L.).
13/7/96	100	0 0	Port Charles	I.	"	Defender ..	William Bourke.
10/5/97	41	3 20	Waikawau ..	VI.	"	Darwin ..	William Oliver Lamb.
29/4/97	98	2 16	Cape Colville	II.	Cape Colville	Donald McKinnon ..	Port Jackson Gold-mining Co. (N.L.).
23/12/96	57	1 16	Tokatea ..	I.	Coromandel	Duke of Wellington No. 1	William H. Davies.
25/5/97	95	0 11	Waikawau ..	IV.	Moehau ..	Echo ..	Francis Charles Stubbs.
21/2/98	100	0 0	" ..	II.	Coromandel	Edinburgh Hauraki	Edwin H. Hardy.
27/2/96	69	2 8	Matamata-harakeke	VI.	Harataunga	Evening Star ..	Evening Star Gold-mining Co. (N.L.).
25/6/96	100	0 0	Coromandel	"	Coromandel	Exchequer ..	F. Swindley and H. C. Bell.
23/7/96	84	3 0	"	"	"	Exchequer Extended	"
22/10/96	100	0 0	Tokatea ..	II.	"	Fabulous ..	Fabulous Gold-mining Co. (N.L.).
21/7/97	50	0 0	Coromandel	"	"	Forest Queen ..	Frederick Charles Ring Horne.
10/8/96	30	0 0	Tokatea ..	"	"	Four-in-Hand ..	Four-in-Hand Gold-mining Co. (N.L.).
27/8/95	30	0 0	"	"	"	Gay City of Auckland	Napier Gold-mining Co. (N.L.).
17/2/96	100	0 0	Matamata-harakeke	VI.	Harataunga	Gisborne ..	City of Gisborne Gold-mining Co. (N.L.).

ABSTRACT OF LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office, at Coromandel—*continued*.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. B. P.					
23/12/96	99 0 0	Tokatea ..	II.	Coromandel	Golden Butterfly ..	Golden Butterfly Gold-mining Co. (N.L.).
29/4/97	87 0 0	Tokara ..	"	"	Golden Lead ..	Golden Lead Gold-mining Co. (N.L.).
21/12/95	70 0 0	Manaia ..	"	"	Golden Hill ..	Golden Hill Gold-mining Co. (N.L.).
6/10/96	18 2 0	Coromandel ..	V.	"	Golden Pah ..	Golden Pah Hauraki (Limited).
23/12/96	100 0 0	Tokatea ..	III.	"	Golden Pheasant ..	Henry Culpan.
22/9/96	58 2 0	" ..	II., III.	"	Golden Plover No. 2	"
30/11/95	100 0 0	" ..	II.	"	Golden Shore ..	Hugh Davis.
19/8/96	37 0 0	Coromandel ..	V.	"	Golden Shore Ext. ..	James Davis.
27/8/95	9 2 12	Tokatea ..	II.	"	Golden Spark ..	Golden Spark Gold-mining Co. (N.L.).
15/9/95	30 0 0	" ..	"	"	Golden Tokatea ..	Golden Tokatea Gold-mining Co. (N.L.).
8/5/95	13 3 35	" ..	"	"	Good Enough ..	Good Enough Gold-mining Co. (N.L.).
28/8/95	28 1 0	" ..	"	"	Good Luck ..	James B. H. Cohen.
23/7/96	99 2 31	" ..	VI.	"	Gordon ..	F. Swindley and H. C. Bell.
22/3/97	100 0 0	Port Charles	II.	Moehau ..	Grand Moehau Freehold Syndicate	Fitzgibbon Lough.
22/3/97	98 1 28	"	"	"	Grand Moehau Freehold Syndicate No. 1	"
12/5/97	7 2 0	Kennedy Bay	II.	Coromandel	Grange ..	John Middleton.
14/9/95	94 0 8	Tokatea ..	"	"	Great Kapanga ..	Great Kapanga Gold-mining Co. (N.L.).
29/10/95	30 0 0	Tiki ..	VI.	"	Great Pukewhau ..	Miowera United Gold-mining Co. (N.L.).
25/5/97	100 0 0	Cabbage Bay	VIII.	Harataunga	Great Sapphire ..	John Bollard.
7/4/96	49 3 0	Manaia ..	XIV.	Coromandel	Great Success ..	George Dunnett.
5/8/97	63 0 37	Tokatea ..	II.	Coromandel	Harbour View ..	Harbour View Gold-mining Co. (N.L.).
21/2/98	54 2 6	" ..	"	"	Hauraki Gem ..	Matthew Dyer.
6/10/96	29 0 11	Coromandel	V.	"	Hauraki ..	Hauraki Gold-mining Co. (Ltd.).
28/5/95	6 0 8	"	"	"	Hauraki No. 2 ..	The Hauraki No. 2 Gold-mining Co. (N.L.).
13/1/97	80 2 32	Cape Colville	II.	Cape Colville	Hauraki Peninsula ..	W. White and G. Linnet.
9/6/96	14 1 25	Coromandel	V.	Coromandel	Hauraki South ..	Hauraki South Gold-mining Co. (Ltd.).
11/12/96	30 0 0	Tokatea ..	II.	"	Hinton ..	Hinton Gold-mining Co. (N.L.).
13/1/97	100 0 0	Manaia ..	III.	Hastings ..	Hunt's Golden Ridge Extended	Thomas McLoughlan.
80/6/97	13 0 0	Coromandel	VI.	Coromandel	Ida ..	Joseph Howard Witheford.
18/5/96	38 1 0	Tokatea ..	II.	"	Jatinga ..	Adolph Kohn.
25/5/97	53 1 18	Cabbage Bay	VI.	Harataunga	Jersey ..	Jersey Gold-mining Co. (N.L.).
10/3/96	30 0 0	Tokatea ..	III.	Coromandel	Jocelyn ..	Jocelyn Gold-mining Co. (N.L.).
7/4/96	39 0 38	Matamata-harakeke	VI.	Harataunga	Just for Luck ..	Morning Star Gold-mining Co. (N.L.).
28/8/95	92 2 35	Coromandel	V.	Coromandel	Kaka ..	Hauraki Golden Bay Mines (Ltd.).
4/10/94	99 3 27	"	I., II.	"	Kapanga ..	The Kapanga Gold-mining Co. (Ltd.).
15/12/97	29 1 7	Kapanga ..	VI.	Coromandel	Kapanga Township	Hugh Campbell and J. J. Duross.
7/6/97	56 0 6	Kennedy Bay	"	Harataunga	Kennedy ..	Kennedy Gold-mining Co. (N.L.).
27/2/96	60 1 0	Matamata-harakeke	VI.	"	Kennedy Bay ..	Evening Star Gold-mining Co. (N.L.).
30/11/96	65 1 0	Ditto ..	"	"	Killarney ..	J. W. Barker.
24/1/96	22 3 36	" ..	"	"	King of the Ranges	Henry Brett.
29/4/97	54 2 20	Kennedy Bay	IX.	"	King David ..	H. Tuterangi, Alexander Keys, and Agnes Preece.
25/5/97	96 2 0	Manaia ..	XIV.	Coromandel	King of Delhi ..	William Over.
8/11/97	60 0 0	Tokatea ..	II.	"	Klondyke ..	Samuel Cohen.
19/9/96	87 0 0	Cabbage Bay	V.	Harataunga	Ladas ..	Ladas Gold-mining Co. (N.L.).
6/2/97	100 0 0	Manaia ..	XIV.	Coromandel	Leading Wind Extd.	William Over.
29/4/97	99 0 0	Cape Colville	II.	Cape Colville	Liberator ..	Port Jackson Gold-mining Co. (N.L.).
5/4/97	51 2 0	Kennedy Bay	III., IX.	Harataunga	London ..	H. Tuterangi and Agnes Preece.
10/7/97	96 0 0	Kennedy Bay	X.	"	Madeline ..	Lindsay Orompton Lanford.
15/9/97	9 1 37	Coromandel	II.	Coromandel	Maud ..	Thomas Meehan.
29/4/97	40 2 18	Kennedy Bay	II., III., IX., X.	Harataunga	Maximum ..	Hugh Lionel Noakes.
27/2/96	50 0 0	Matamata-harakeke	VI.	"	Madge ..	Madge Gold-mining Co. (N.L.).
13/5/96	30 0 0	Coromandel	"	Coromandel	Magnet ..	Magnet Gold-mining Co. (N.L.).
23/3/97	11 3 13	Kennedy Bay	IX.	Harataunga	Maio No. 2 ..	William O. Lamb.
1/9/96	30 0 0	Tokatea ..	II.	Coromandel	Marble Arch ..	W. H. Thompson.
23/2/97	24 2 0	Manaia ..	XIV.	"	Marlborough ..	J. D. Colebrook.
3/2/97	100 0 0	Kennedy Bay	IX.	Harataunga	Mascotte ..	A. H. Keesing.
25/5/97	96 2 0	Waikawau ..	IV.	Moehau ..	Mercantile ..	Francis Charles Stubbs.
27/2/96	82 1 20	Coromandel	VI.	Coromandel	Miowera ..	Miowera United Gold-mining Co. (N.L.).
29/4/97	60 0 0	Waikoromiko	II.	"	Monarch ..	John Wiseman.
29/4/97	56 3 0	Kennedy Bay	IX.	Harataunga	Moonstone ..	Stewart Frederick Bates.
24/1/96	15 3 14	Manaia ..	XIV.	Coromandel	Native ..	Ernest C. Daldy.
18/5/96	82 2 18	Tiki ..	VI., VII., X., XI.	"	Native Chief ..	Native Chief Gold-mining Co. (N.L.).
11/2/96	14 2 28	Coromandel	VI.	"	New Hauraki ..	New Hauraki Gold Properties (Ltd.).
5/8/97	94 1 24	"	"	"	New Hauraki Gold Properties (Limited) No. 1	"
5/8/97	66 0 0	"	"	"	New Hauraki Gold Properties (Limited) No. 2	"
15/12/96	8 2 0	Tiki ..	XI.	"	Newhaven ..	William J. Smith.
2/7/95	26 0 32	Tokatea ..	II.	"	New Hero ..	John Mayn.
28/5/95	16 1 28	Coromandel	"	"	New Tokatea ..	Tokatea Consols Gold-mining Co. (Ltd.).
27/8/95	14 0 0	Tokatea ..	"	"	New Tokatea Extd.	"
7/6/97	58 1 0	" ..	"	"	New Triumph ..	Charles Malcolm McFarlane.
24/7/97	82 0 0	Kennedy Bay	X.	Harataunga	Noko ..	Arthur Frederick Witty.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office,  
at Coromandel—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
30/6/97	A. B. P. 25 8 16	Preese's Point	V.	Coromandel	Nora ..	Henry Thomas Gorrie.
24/7/97	99 2 0	Kennedy Bay	VI.	Harataunga	North Star ..	Flossie Gold-mining Co. (N.Z.).
24/1/96	14 0 0	Tiki ..	X.	Coromandel	Old Pukewhau ..	The Nestor Gold-mining Co. (N.L.).
7/6/97	48 2 10	Tokatea ..	II.	"	Orina ..	Hauraki (N.Z.) Associated Gold-mines (Ltd.).
12/5/97	0 1 0	Coromandel	VI.	"	Pai Hauraki ..	Thames Exploration Syndicate of London and New Zealand.
23/11/95	36 0 32	Tokatea ..	II.	"	Paul's Creek ..	William James Allen.
15/9/97	8 3 0	Coromandel	VI.	"	Peeblean ..	Matthew Dyer.
19/5/96	7 1 6	"	V.	"	Pegasus ..	Frederick Swindley.
25/6/96	36 0 0	"	VI.	"	Pegasus Extended ..	"
23/2/97	14 2 0	Manaia ..	XIV.	"	Picton ..	W. H. J. Ridley.
23/12/96	32 0 32	Tokatea ..	II.	"	Pigmy ..	The Pigmy Gold-mining Co. (N.L.).
10/5/97	100 0 0	Kennedy Bay	VI.	Harataunga	Pinafore ..	William Oliver Lamb.
11/8/96	100 0 0	Tokatea ..	"	Coromandel	Plunger ..	Plunger Gold-mining Co. (N.L.).
15/12/97	100 0 0	Pukewhau ..	X.	"	Pohutu ..	Hauraki Development Syndicate (Ltd.).
27/2/96	100 0 0	Tokatea ..	II.	"	Poneke No. 1 ..	Henry C. Bell.
8/7/96	53 1 8	Coromandel	VI.	"	Poneke No. 2 ..	F. Swindley and H. C. Bell.
24/1/96	15 3 5	"	II., VI.	"	Poneke No. 3 ..	Henry C. Bell.
7/6/97	38 0 18	Tokatea ..	II.	"	Pride of Tokatea ..	Hauraki (N.Z.) Associated Gold-mines (Ltd.).
7/6/97	48 1 0	Kennedy Bay	X.	Harataunga	Prince of Wales No. 2	Tobias Henry Keesing.
21/12/95	100 0 0	Manaia ..	II., III.	Hastings ..	Princess May ..	Princess May Gold-mining Co. (N.L.).
21/12/95	82 2 0	"	II.	"	Princess May South	Hugh and Arthur Bishop.
23/7/96	60 0 0	Tiki ..	X.	Coromandel	Progress Castle Rock	Progress Castle Rock Gold-mining Co. (N.L.).
23/2/97	25 3 0	Manaia ..	XIV.	"	Prophecy ..	John Hague Smith.
1/12/96	17 0 10	Tiki ..	X.	"	Pukewhau ..	Pukewhau Gold-mining Co. (N.L.).
25/5/97	97 2 0	Waikanae ..	V.	Harataunga	Queen of Waikanae	Thomas James McIvor.
25/5/97	36 1 0	"	"	"	Queen of Waikanae Extended	"
8/2/97	100 0 0	"	VIII.	Harataunga	Rainbow ..	Thomas Handley.
24/4/96	100 0 0	Tokatea ..	II.	Coromandel	Rangitira ..	Arawata Gold-mining Co. (N.L.).
25/5/97	40 3 6	Kennedy Bay	VI.	Harataunga	Rangipuhi ..	Rangipuhi Gold-mining Co. (N.L.).
25/5/97	100 0 0	Manaia ..	XIV.	Coromandel	Ridley ..	William Henry Jones Ridley.
29/4/97	99 0 36	Cabbage Bay	VIII.	Harataunga	Rothsay Castle ..	Henry J. Ross.
10/5/97	60 0 0	Kennedy Bay	IX.	Harataunga	Royal Standard ..	John McIsaac.
11/2/96	9 2 10	Tiki ..	X.	Coromandel	Royal Mint ..	Rickley F. Gerdes.
27/2/96	39 1 9	Tokatea ..	II.	"	Royal Oak of Hauraki	Royal Oak of Hauraki (Ltd.).
6/2/97	21 0 0	Manaia ..	XIV.	"	Royal Victor Extd ..	Robert S. Collier.
7/6/97	65 0 0	Kennedy Bay	X.	Harataunga	Sandhurst ..	Alexander Alison.
23/12/96	100 0 0	Te Papaki ..	VIII.	"	Scottish Chief ..	Henry James Ross.
21/2/98	68 0 17	"	II.	Coromandel	Scotty's ..	Scotty's Gold-mine (Ltd.).
15/12/96	2 3 9	Coromandel	VI.	"	Shotover No. 2 ..	T. J. Goldsmith.
1/9/95	13 2 10	Tokatea ..	II.	"	Southern Star ..	Southern Star Gold-mining Co. (Ltd.).
12/1/98	12 2 28	"	"	"	Southern Star Extd.	Herbert C. Woolmer.
10/3/96	30 0 0	Tokatea ..	"	"	Speedwell ..	James Buchanan and Angus McNeil.
25/6/96	99 2 0	Coromandel	VI.	"	Standard ..	F. Swindley and H. C. Bell.
2/7/95	30 0 0	Tokatea ..	II.	"	"	Edward Claude Randle.
9/6/96	17 1 33	Coromandel	VI.	"	Standard Extended ..	Frederick Swindley.
28/8/95	88 0 0	"	V.	"	Stanley ..	Hauraki Golden Bay Mine (Ltd.).
4/8/96	7 0 22	Tokatea ..	I.	"	Star ..	Montgomery Davis.
21/12/95	51 0 20	"	II.	"	Star of the East ..	G. Harper and Carlo Blasch.
19/9/96	60 0 0	"	"	"	Star of Tokatea ..	Star of Tokatea Gold-mining Co. (N.L.).
15/12/97	100 0 0	Coromandel	V.	"	Stirling ..	William Thompson McGregor.
5/8/97	40 2 0	Manaia ..	X.	"	Streak of Luck ..	Roderick S. Macauley.
10/3/96	15 2 6	Coromandel	II., VI.	"	Success ..	Success Gold-mines (Ltd.).
5/2/95	5 0 25	"	II.	"	Suez Extended ..	New Golconda Gold-mining Co. (N.L.).
18/5/96	100 0 0	Tokatea ..	"	"	Tainui ..	S. W. Bedlington.
19/9/96	42 0 38	"	"	"	Tainui Extended ..	J. M. Brigham, jun.
10/3/96	30 0 0	"	"	"	Tandem ..	Tandem Gold-mining Co. (N.L.).
24/7/97	71 0 0	Kennedy Bay	X.	Harataunga	Tawera ..	Arthur Frederick Witty.
1/2/96	75 2 2	Tokatea ..	II.	Coromandel	Tokatea of Hauraki	Tokatea of Hauraki (Ltd.).
23/12/96	91 2 11	"	III.	"	Tokatea Hinemoa ..	Tokatea Hinemoa Gold-mining Co. (N.L.).
10/7/97	80 3 25	"	II.	"	Tokatea Provident ..	William Morris.
28/3/97	30 0 0	"	"	"	Tongariro ..	Charles M. McFarlane.
15/9/97	15 1 20	Coromandel	VI.	"	Trig Hill ..	T. Morrin, S. T. George, J. Russell, and J. W. Lennox.
21/2/98	100 0 0	"	II.	"	Trilby ..	Trilby Gold-mining Co. (N.L.).
30/4/95	30 0 0	"	"	"	Triumph ..	Triumph Gold-mining Co. (Ltd.).
25/6/96	98 2 25	Kennedy Bay	IX.	Coromandel	Vanderbilt ..	Vanderbilt Gold-mining Co. (N.L.).
14/3/98	20 0 10	Tiki ..	X.	Harataunga	Vaughan ..	The Matawai Gold-mining Co. (N.L.).
12/1/98	20 3 0	"	II., VI.	"	Vigilant ..	Henry C. Bell.
6/10/96	2 0 0	Kennedy Bay	IX.	Harataunga	Vizards ..	James J. Craig.
29/4/97	100 0 0	Puraemauku	III.	"	Waiaro Proprietary	Robert T. Graham.
15/12/97	36 3 0	Pukewhau ..	X.	Moehau ..	Waikiti ..	Hauraki Development Syndicate (Ltd.).
8/7/96	68 1 21	Tokatea ..	II.	Coromandel	Waikoromiko ..	Waikoromiko Gold-mining Co. (N.L.).
15/12/97	100 0 0	Pukewhau ..	X.	"	Wairaki ..	Hauraki Development Syndicate (Ltd.).
24/10/96	86 1 0	Coromandel	VI.	"	Watohman ..	Hugh A. Bishop.
7/4/96	47 1 25	Manaia ..	XIV.	"	Waterfall ..	Albert Goldwater.
5/2/95	8 1 8	Coromandel	V.	"	Welcome Find ..	Welcome Find Gold-mining Co. (Ltd.).

**ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Coromandel—continued.**

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
23/12/96	A. 97	B. 8	P. 8	Matamata-harakeke	XI.	Harataunga	West Derby ..	West Derby Gold-mining Co. (N.L.).
2/7/95	29	8	82	Tokatea ..	II.	Coromandel	West Tokatea ..	Harold John Morrissey.
10/5/97	99	1	0	Kennedy Bay	IX.	Harataunga	Whareroa Reef ..	Frederick Rollett.
14/7/97	15	0	0				Wilga ..	
2/4/97	24	0	17	Coromandel	V.	Coromandel	Zealandia ..	Zealandia Gold-mining Co. (N.L.).
<i>Kuaotunu District.</i>								
4/8/96	30	0	0	Kuaotunu ..	V.	Otama ..	Alpine Fluke ..	Alpine Fluke Gold-mining Co.
4/8/96	16	2	23	" ..	"	" ..	Alpine Fluke ..	Alpine Fluke Gold-mining Co. (N.L.).
7/4/96	100	0	0	" ..	II.	" ..	Aorere ..	Aorere Gold-mining Co. (N.L.).
14/9/95	99	0	0	" ..	V.	" ..	Aorere No. 2 ..	Midas Gold-mining Co. (N.L.).
18/5/96	42	0	0	" ..	"	" ..	Argentine ..	Ajax Gold-mining Co.
12/11/95	30	0	0	" ..	"	" ..	Balfour ..	Balfour Gold-mining Co. (N.L.).
21/12/95	50	0	0	" ..	II.	" ..	Geraldine ..	William H. Cooper.
6/12/95	71	2	10	" ..	V.	" ..	Golden Anchor ..	Golden Anchor Gold-mining Co. (N.L.).
29/5/96	100	0	0	" ..	II.	" ..	Golden King ..	Golden King Gold-mining Co. (N.L.).
10/3/96	30	0	0	Whitianga ..	XII.	Coromandel	Great Britain ..	William Jones Smith.
12/3/96	72	2	0	Mercury Bay	III., VI.	Otama ..	Great Consols ..	John Drew Colebrook.
19/11/89	28	0	12	Kuaotunu ..	V.	" ..	Great Mercury ..	Great Mercury Gold-mining Co. (Ltd.).
12/5/96	5	2	1	" ..	II.	" ..	Handsworth ..	Louis Woodcock.
29/10/95	21	1	16	" ..	V.	" ..	Hosie ..	Robert Workman.
22/9/96	57	2	0	" ..	"	" ..	Irene ..	Irene Hauraki.
11/10/97	47	1	25	" ..	II.	" ..	Invicta ..	Invicta Gold-mining Co. (N.L.).
24/1/96	21	2	0	Whangapoua	I.	" ..	Jumpers ..	Donald Watson.
25/2/98	99	2	0	Kuaotunu ..	IV., V.	" ..	Jupiter No. 1 ..	Sir T. S. Tancred and John Whittaker.
25/2/98	94	0	0	" ..	IV.	" ..	Jupiter No. 2 ..	"
25/2/98	84	8	0	" ..	"	" ..	Jupiter No. 3 ..	"
25/2/98	66	1	0	" ..	"	" ..	Jupiter No. 4 ..	"
1/10/95	4	0	0	" ..	V.	" ..	Kapai-Vermont ..	Kapai-Vermont Gold-mining Co. (Ltd.).
15/5/95	31	3	19	" ..	"	" ..	" ..	"
12/5/96	9	2	0	" ..	II.	" ..	Kuaotunu Extended	Kuaotunu Gold-mining Co. (N.L.).
24/7/97	100	0	0	Kaimarama	V.	Hastings ..	Little Marlow ..	Ernest John Nankivell.
13/11/95	100	0	0	Kuaotunu ..	II.	Otama ..	Lucky Hit ..	Kuaotunu Gold-mining Co. (Ltd.).
13/9/95	100	0	0	" ..	"	" ..	Maori Dream ..	Maori Dream Gold-mining Co. (N.L.).
13/11/95	100	0	0	" ..	"	" ..	Maoriland ..	Maoriland Gold-mining Co. (Ltd.).
24/4/96	93	0	0	" ..	III.	" ..	Mount Margaret ..	Frederick E. Baume.
7/6/97	100	0	0	Matarangi ..	IV.	" ..	Murphy's Hill ..	Kauri Freehold Gold Estates (Ltd.).
4/8/96	23	3	0	Kuaotunu ..	V.	" ..	New Mint ..	Robert Edward Workman.
29/4/97	68	1	30	Mahakirau ..	XV., XVI.	Coromandel	Nina ..	Lionel Nathaniel Benjamin.
11/10/97	83	3	18	Kuaotunu ..	V.	Otama ..	Norena ..	Norena Gold-mining Co. (N.L.).
24/10/93	29	1	35	Matarangi ..	I.	" ..	Ocean View Extended	Matarangi Gold-mining Co. (Ltd.).
24/7/97	100	0	0	Kuaotunu ..	II.	" ..	Otama ..	Juno Gold-mining Co. (N.L.).
24/7/97	100	0	0	Mercury Bay	XII.	Coromandel	Owera ..	Kauri Freehold Gold Estates (Ltd.).
8/11/97	98	0	0	Kuaotunu ..	IV.	Otama ..	Phoenix ..	Phoenix Gold-mining Co. (N.L.).
7/10/96	94	1	35	Mahakirau ..	XIV.	Coromandel	Peru ..	James McGregor.
6/2/96	69	0	15	Kuaotunu ..	V.	Otama ..	Prospect ..	Prospect Gold-mining Co. (N.L.).
5/8/97	58	0	0	Kaimarama	IV.	Hastings ..	Sapphire ..	Frederick A. Clarke.
1/10/95	6	1	12	Kuaotunu ..	V.	Otama ..	Try Fluke Extended	Mariposa Gold-mining Co. (Ltd.).
18/5/96	100	0	0	" ..	"	" ..	Try Fluke ..	"
24/4/96	85	2	0	" ..	"	" ..	Waitaia ..	Waitaia Gold-mines (Ltd.).

*Port Charles District.*

In this district very little work has been carried on during the year. In February last there were only three parties working their claims, &c.

The Eva Claim, one man's ground, is worked by the McNeil Brothers—two men. They have had a crushing of 1 ton 4 cwt. 2 qr. of stone, which yielded 391 oz. 19 dwt. of gold, valued at £1,058 5s. 4d., which they say was taken from small stringers near the surface. There is a large reef outcropping on the crown of the hill, which they are driving on in a level at a depth of 35 ft.

Prospecting has also been carried on in ground owned by the Hauraki Peninsula Gold-mining Company, which lies between Big Stony Bay and Cape Colville.

*Cabbage Bay District.*

*White Star Consolidated Mine.*—During the year a considerable amount of work has been done driving on different levels, but no discovery of any importance has been made. At one time sixteen men were employed.

Prospecting work has also been carried on in the Canopus, Cuvier Light, Antipodes, and City of Gisborne Claims.

In the Queen Victoria Mine work was for a time carried on, and a parcel of quartz weighing 42 lb. yielded a return of 2 oz. 14 dwt. 7 gr., valued at £7 12s. 5d.

In the Jersey Claim, in which prospecting was carried on for a considerable time, a parcel of 8 tons 2½ cwt. of stone was crushed, for a return of 70 oz. 6 dwt., valued at £205 12s. 6d.

*Kennedy Bay District.*

The Bay View Mine was worked by a party of tributers, who have driven a level to connect with the winze, from which a small return was obtained last year.

The Flossie Claim was also worked for a time by a party of tributers. In the Evening Star Mine prospecting was for a time carried on by two men. The Morning Star Claim was also prospected by a party of two men. Other claims were also prospected for a short time.

*Paul's Creek District.*

In the Golden Lead Claim prospecting operations were carried on for a short time, a crushing of 10 tons yielding 4 oz. 14 dwt. of gold, valued at £13 12s. 11d.

*Waikoromiko District.*

*Forest Queen Mine* (Area, 50 acres).—This mine is owned by Messrs. F. Horne and P. Johnson. The work so far is principally of a prospecting nature, and a number of leaders and reefs have been located on this property. The principal development work has been carried out on the Forest Queen reef. This reef varies in size from a few inches to 2 ft. 6 in. A level has been put in for about 200 ft., giving 30 ft. of backs. One ton of ore from this gave a return of 15 oz. melted gold. Another cross-cut has been driven about 70 ft. below, and cuts the reef at 190 ft. in from the mouth. It is then driven on for 140 ft. to the north-west. A crushing from this portion at the Thames School of Mines gave a return of 7 oz. 12 dwt. melted gold from half a ton of ore. The general run of the reefs in this property is north-west and south-east, varying in size from 3 ft. in width to small veins. The Forest Queen reef traverses a kindly class of country, being decomposed andesite or propolite. It is found to carry gold for over 100 ft., some of the stone yielding 1 oz. to the pound. Another old level which was cleaned out showed eleven reefs and leaders mostly running parallel to and dipping the same way as the Forest Queen reef—to the southward. As it is a pack-track which leads to the mine it is only the richest of the ore that can be taken to the battery. The gold won from this mine is valued at £2 17s. 6d. per ounce, and, with a crushing plant, the owners are confident that the mine would soon become remunerative.

*Four-in-Hand Mine* (Area, 30 acres).—Work has been carried on on the reef opened in this mine, seven men being for some time employed.

Work has also been done in the Tandem, Fabulous, Waikoromiko, Cuirassier, and other claims, but in most instances the claims in this district have been abandoned.

*Tokatea District.*

*Royal Oak Mine* (Owners, Royal Oak of Hauraki, Limited).—This company is getting good returns between the No. 5 and above that level and to the No. 6 level on No. 1 tribute leader, while a cross-cut is being constructed to cut the same reef at the No. 7 level, which will give a further 160 ft. vertical. At the same time a winze is being constructed to go down at the end of the cross-cut. Also, a large section of fair-grade ore is being opened up between the No. 9 and No. 8 levels, on the main Tokatea reef. This is a considerable depth, being over 1,000 ft. below the crown of the hill. This section of ground is very valuable also to the development of No. 1 tribute leader, as it is proposed to construct another cross-cut from the bottom of this shaft (which is 160 ft. below No. 7) to again intersect that reef. A new ten-head battery, all complete, with stone-breaker, is being erected at the battery-site, to be got in readiness by such time as the reserves from the Tokatea reef are laid open. The whole developments are concentrated, so that all the ore shall be delivered from the No. 7 level to the battery. A considerable amount of work is being done to concentrate all the water available in the locality, in order to pump from the shaft, to work the battery, and to work rock-drills. This is now well in hand, the machinery being ordered. The cost of this scheme to the company will be not less than £7,000. With this completed, the mines, which are extensive, will have every facility for working on an economical scale. The total quantity of quartz crushed by the company is 200 tons of general ore and 10,590 lb. of picked stone, which gave a result of 9,702 oz. 4 dwt., of a value of £24,441 10s. 2d. This company has recently declared a dividend on a million shares at 3d., which has been won since August last; and it is hoped, by the large scheme in hand, and the way in which the mines are being worked, to well pay the shareholders for their perseverance and outlay.

*West Tokatea Mine* (Area, 30 acres; owners, the East Hauraki Company).—This mine has been fairly opened up in the past. The main adit or low level is driven 460 ft., which now gives 250 ft. of backs. There are two other levels opened above, giving respectively 80 ft. and 130 ft. of backs. The reefs principally run north-east and south-west, and vary in size from 4 in. to 2 ft. The quartz is of a hard and flinty nature. During the past year the mine has been closed under protection, awaiting further capital, until last February, when a small capital was promised for further development. Since then four men have been employed in the upper levels driving on a reef that has not yet been intersected in the low level, with a view to obtain sufficient ore for a trial crushing; and, if it proves satisfactory, no doubt further capital will be available for systematic development. At present no machinery is employed.

*Harbour View Mine* (Area, 65 acres; Harbour View Gold-mining Company, owners).—Operations have been carried on in a desultory manner, and during a considerable part of the year the claim was under protection. At the present time two wages-men and six tributers are employed.

*Hauraki Associated Mine* (Area, 68 acres; owners, Hauraki Associated Gold-mines, Limited, an English company).—The mine is well opened by three levels, the nature of the country being very favourable for working from tunnels. No. 1, 500 ft. in length, is 200 ft. below the top of the range; No. 2, 600 ft., 100 ft. below No. 1; and No. 3, 150 ft., is 100 ft. lower than No. 2. Two lodes—the Rainbow and Foot-wall leaders—are being worked at No. 1 and No. 2 levels, the principal portion of the quartz treated having been derived from those reefs. There are other reefs and veins of various width. The gold obtained is chiefly derived from the smaller veins, about 2 in. wide. There is no machinery required at the mine, but a battery consisting of one stone-breaker, twelve

head of stamps, and four berdans has been erected at the foot of the hills on the Kennedy Bay side of the ranges. The battery is driven by either steam- or water-power. A steam-engine, 20-horse power, is being used to drive the mill when water gets scarce. The water-race is 60 chains in length, and made to carry five sluice-heads, the pressure being 50ft. A Smith and Vaile turbine is used for motive-power. The quantity of quartz crushed was 370 tons, the treatment being solely by amalgamation, and 1,345 oz. of gold, value £3,800, was obtained, showing the return—£10·27 per ton—to be of a high standard. Forty men were employed.

*Tokatea Consols Mine* (Area, 30 acres; owners, the Tokatea Consols Gold-mines, Limited).—Operations have been carried on on the leaders formerly opened up, and 63 tons 13 cwt. crushed yielded a return of 267 oz. 3 dwt., valued at £774 11s. 10d. Nine men were employed.

*Triumph Mine*.—Very little work was done at this mine, and 162 tons of stone yielded 11 oz. 14 dwt. of bullion, valued at £33 11s. 9d. Four men were employed.

*Queen of the North Mine*.—Prospecting operations were carried on during the year, only a few men being employed.

*Southern Star Mine* (Area, 13 acres 2 roods 10 perches; owners, Southern Star Gold-mines, Limited).—Operations were for a time carried on, and a crushing of 38 tons 15 cwt. returned 15 oz. 10 dwt. of bullion, valued at £40 7s. 3d.

In the Golden Spark Mine a crushing of 2 tons of stone returned 12 oz. 10 dwt. of gold; value, £42.

Prospecting was also carried on in the Buffalo Claim; 7½ tons of stone was crushed, for a return of 126 oz. 16 dwt., valued at £369 18s. 9d.

Prospecting operations were also carried on in other mines, but no returns are recorded.

*Success Gold-mines (Limited)*.—The greatest depth of workings in this mine below surface is 275 ft. In the deepest level the Company is driving to come under and in line with the No. 2 Success reef, that yielded the rich gold in the upper workings. A winze is sunk to that depth, so that once a communication is effected the mine will be thoroughly well ventilated. At that point it is proposed to cut a chamber, and with the aid of an air-compressor and an air-winch to sink a trial shaft in line of the run of gold, to test its value in depth. In the upper series of workings prospecting will be continued on the blocks of ground, in the hope of meeting similar rich patches of gold to those got in the early days. The property is also being well prospected on the surface. The company is thoroughly developing the property, and it is hoped they will meet with the success they so richly deserve.

*New Hauraki Gold Properties (Limited)*.—This company is engaged testing the various large reefs discovered on the property. Very recently a large reef was discovered, from which samples were obtained carrying gold-ore worth £2 14s. per ton. The average of the reef, however, makes the ore of too low grade to pay. The object of the company in following up these large reefs is to try and discover a payable section in any one of them. Should this be accomplished the success of the company would be immediately assured, as the bodies of ore would be enormous. Considerable prospecting is being carried on throughout the property, which is of large extent, and ultimately it is hoped to make this company a success. Twenty-six men were employed.

#### *Kapanga District.*

*Kapanga Mine* (Owners, the Kapanga Gold-mining Company, Limited).—1,000 ft. level: This level has been driven west 654 ft. The Kapanga reef was intersected near the forebreast, and proved to be of no value. The object of driving this level was to intersect the two main reefs on the property—the Scotty's and Kapanga—in junction. In the upper levels they were inclined to junction, but at this level they are apparently as far apart as they were where intersected in the 300 ft. cross-cut east. The Scotty's reef, where cut through, was also poor. In this level we extended south-easterly on a reef 79 ft. We sunk a winze below the level 11 ft., and put up a rise 36 ft. The vein was small, but both in the rise and winze strong dabs of gold were met with. The reef is known as the Anniversary reef. The reef known as Cadman's, in the south-east drive, also showed colours occasionally. The width of this reef varied from 15 in. to 6 in. of solid quartz. 940 ft. level: At this level 339 ft. were driven west and 56 ft. east. A cross-cut was developed 22 ft., a rise extended 77 ft., and a winze sunk 66 ft. These developments were mostly on what is known as Hartridge's reef, a fine body of stone of very promising appearance, showing colours, and at times some nice picked stone. This is presumably the same reef that was intersected in sinking the shaft, at which point it yielded a good patch of rich stone. 900 ft. level: At this level 109 ft. were driven east and 71 ft. north. A rise was put up 27 ft., and a winze sunk 21 ft. This reef was supposed to be Hartridge's, and has produced low-grade ore. 700 ft. level: At this level the only point of development has been the extension of the cross-cut 217 ft. where it communicated with the level below for ventilation purposes. 500 ft. level: At this level 90 ft. were driven on the Kapanga reef north. 420 ft. level: 96 ft. have been driven on the Kapanga at this level, and a rise put up 17 ft. On Scotty's, at the intermediate, we have driven 105 ft. and risen 29 ft. In these developments fair and poor-grade ore was obtained, but in small quantities. 300 ft. level: 147 ft. were driven on the hanging-wall of Scotty's at this level and 150 ft. on the Kapanga. A winze was sunk on Scotty's 17 ft. and a rise put up 30 ft. Corby section: A considerable amount of work has been done in this section of the property. 181 ft. were developed in cross-cutting and drives, and a rise put up for 21 ft. The water was a great hindrance to development in this section. It is now suspended. Thirty-six tributes were let, seven being on the surface sections of the property and twenty-nine below ground—at the 200 ft., 300 ft., and 420 ft. levels. Most of these tributes have since been surrendered. There are now being worked three on the surface and nine below ground. Only eleven of these tributes got any returns, and of these two have been very successful. By the aid of the Government the company have been enabled to test the country-rock about 230 ft. below the 1,000 ft. level by means of the diamond drill, an exhaustive report upon which was forwarded to you at the end of 1897. Operations at the lower levels are for the moment suspended, the financial



resources of the company being scarcely sufficient to continue the development of lower levels at the present time. All efforts are now being concentrated to work the various blocks of ground both on the Kapanga and Scotty's above the 420 ft. level, and I see no reason why these developments should not open up valuable returns, and, with the capital in hand, give results to enable the shareholders at some future time to resume operations at the deeper levels, and also recoup their outlay.

*Scotty's Gold-mine (Limited).*—The main shaft of this company has now reached a depth of 400 ft. At this level a cross-reef has been intersected near the shaft, and driven on, intersecting Breuer's reef. We are now engaged driving north, to come under the winze which yielded the rich patch of gold. The winze is the same depth as this level, and we hope in a few weeks to effect communication for ventilation. We shall then proceed to drive north for the winze, in which direction we have reason to believe we may pick up a run of gold at this level. At the 300 ft. level we are rising, stoping, and driving intermediate levels through large bodies of quartz, which at any time may disclose rich discoveries. The whole of these works may be termed prospecting. At the 157 ft. level we are developing Scotty's reef. The reef is very similar in character to where rich gold has been found in this reef, but a fault detrimental to its yielding gold is the fact that it is running almost horizontal. We are trying to locate its uniform strike, which is westerly, and at a grade of 2 in 1. We feel confident if we can effect this we shall be successful. The property is being very vigorously developed with forty men, and I hope with the developments in hand to make the mine a success.

[The foregoing two reports are furnished by Capt. Hodge, the manager of the mines.]

The Manola Claim also crushed 130 lb. of stone, for a yield of 100 oz. 6 dwt. 16 gr., valued at £284 11s. 1d. Two men were employed.

#### *Kauri Block.*

*Hauraki Mine* (Owners, Hauraki Gold-mining Company, Limited).—This company, for thirteen lunar months, ending 11th December, 1897, by the development of, I may say, twenty reefs and small veins, obtained fair results. The development works are summarised as follows: Shafts sunk, 52 ft.; cross-cuts driven, 403 ft.; drives on lodes, &c., 1,286 ft.; rises, 183 ft.; winzes, 162 ft.; stoping, 4,805 ft. (stoping is in lineal feet, 6 ft. high, the width of the reef); levels cleared, &c., 217 ft.: giving a grand total of 7,108 ft. The old Union Beach section has also been equipped with machinery, cleared of water, and to-day the mine is in active operation. In the Hauraki a permanent pumping plant has been erected, and is at work. We have very nearly completed our second plunger-lift 13 in. to the 400 ft. level. Developments at this level will be resumed in a few days. In this mine we have now two plunger-lifts, and the shaft is in fair order to resume sinking at any moment. The company's returns have been (ending 11th December, 1897) £35,710 5s. 3d. Total gold won for the year, 11,793 oz. 3 dwt.; total quartz crushed, 4,275 tons; total picked stone treated, 4,778 lb. (or 2 tons 2 cwt. 2 qr. 18 lb.): making total amount of ore treated, 4,277 tons 2 cwt. 2 qr. 18 lb. The average price of gold per ounce was £3 0s. 6-73d.; average yield of gold per ton of ore, 2 oz. 15 dwt. 3-48 gr. At the present time the mine is a little more than paying costs. The importance of this mine in the future developments rests with the development of the 400 ft. level and below. There is practically nothing done below the 300 ft. level. We have a reef dipping west through our entire property and towards the Union Beach section (known as Ross's No. 6), and, taking the line of bearing, we have reason to believe it to be the cross-reef worked on in that mine which gave such fabulous results. This in the coming year will be proved, and if it yields as it promises to do to-day it will be a valuable development for the company. This is now yielding at times rich ore. The outlay of the company has been considerable in the way of machinery and laying off the mines on a permanent basis to be carried on in a miner-like manner. This is now overcome, so that we have now a free hand to put all efforts in the vigorous development of the property without any extraordinary outlay in extraneous costs, and I trust the future of the company will be a good one for the shareholders. [The foregoing is extracted from a report by the manager, Captain Hodge.]

*Welcome Find Mine* (Area, 8 acres 1 rood 8 perches).—This mine has been kept working during the year. The engine-shaft has been sunk 36 ft.: total depth, 236 ft. No. 3 level: After forming a good chamber, a cross-cut was started at this, our lowest, level (230 ft. from the surface), and extended 210 ft. Two promising lodes were exposed here, one averaging about 5 in. in width, the other about 18 in. No. 2 level (170 ft. below the surface): A great deal of prospecting work has been done at this level, and on four different bodies of crystallized quartz varying from small veins 2 in. to reefs 6 ft. in width. No. 1 level (110 ft. from the surface): Much work has been done here in the form of driving and rising during the past year, the principal operations being confined to the development of a fine body of oxidized ore from 15 in. to 4 ft. in width, and the country in which it is encased is of a favourable nature for gold. There has been 579 ft. of cross-cutting, 603 ft. of driving on the line of reef, 56 ft. of winze-sinking, 34 ft. of driving, and about 56 fathoms stoped. A crushing of 58 tons of general stuff and 140 lb. of picked stone produced 235½ oz. of bullion; value, £682 19s. It was treated at the Thames at a cost of 6s. per ton. There have not been any additions to the machinery in the past year. The 40-horse-power pumping- and winding-engine combined is all that is required at the present time. Fifteen men were employed.

*New Golconda Mine* (Area, 5 acres; owners, New Golconda Gold-mining Company, Limited).—During the early part of the year this mine was protected, but operations were resumed on the 1st November last. New buildings were erected, and a steam-winch for winding provided. The low level was extended, and is now in 320 ft. In this drive, which is in a north-easterly direction, several leaders have been cut. On No. 1 leader 40 ft. has been driven and a rise put up to No. 1 level. Gold was got in the leader half-way between the two levels, and an intermediate drive put in to the Welcome Find boundary. This block was stoped out up to No. 1 level, and twelve loads of general quartz and 60 lb. of specimens yielded gold—60 oz.; value, £180. A drive was put in from



the shaft to reach the top of the rise, and driving and stoping are being carried on in favourable-looking country. Five men were employed.

*Zealandia Mine*.—Very little work was done during the year, and the claim is now under protection.

*Bunker's Hill Mine* (Area, 3 acres and 12 perches; owners, the Bunker's Hill Gold-mining Company).—Driving and stoping have been carried on at the different levels on various reefs and leaders, averaging from 2 in. to 2 ft. in width; and 21 tons of quartz was crushed, for a yield of 139 oz. 5 dwt., valued at £410 2s. 4d. Fourteen men were employed.

*Hauraki North Mine* (Area, 25 acres; owners, Hauraki North Gold-mining Company, Limited).—During the year the main shaft was sunk a further distance of 64 ft., and is now 223 ft. in depth. Two levels are opened, and the two reefs worked on those levels are from 1 ft. 6 in. to 2 ft. in width. The quantity of quartz mined and sent to the battery was 241 tons, which yielded 173 oz. 3 dwt. of gold; value, £360 15s. The number of men employed was seventeen in mine and battery.

*Kathleen Crown Mine* (Area, 95 acres).—The freehold of this mine is owned by the Kathleen Crown (Limited), an English company. During the year a considerable amount of work has been accomplished in the mine. Argall's reef has been developed by driving the north and south levels, and, though traversing country favourable for gold, no payable returns have been obtained. The reef has been risen on also in two places where it appeared, 10 in. in width, encased in a congenial class of andesite, with a good hanging-wall. The ore, however, was only low grade. No. 1 reef at bottom level has been driven on for a distance of 381 ft. in a southerly direction, at times passing through very indifferent country, and not long since through a hard belt of diorite rock. The reef has varied in size from 3 ft. to 10 in., and, although not unpromising in appearance, tests have only disclosed traces of gold in the quartz. A drive to the northward on this reef is now in 254 ft. Sandstone and mineral veins have been met with, and considerable disturbance in the country. Though the reef has averaged 2 ft., it is now split up into small stringers largely consisting of calcite. A rise was made on this reef, with a twofold object in view—viz., fetching the old workings known as Quail's drive and prospecting the reef, and to secure better ventilation, as well as to be a second means of exit from the workings. This is now accomplished, and thorough ventilation provided. Several small leaders are here running parallel to the reef, and will probably drop into it. In the month of July operations were started in what is known as Thompson's section, where a drive was put in and two small leaders intersected, carrying prospects of gold. These have been driven on almost to the boundary of the property, and are evidently the same veins that have been developed in the Blagrove's Mine adjoining, from which a fair crushing was obtained. In this mine they give good dish prospects, as well as small pieces of stone showing gold, which is coarse in quality. Two crushings of general stuff were treated at the Kapanga battery, for returns of 7 oz. retorted gold from 6 tons and 5 oz. 9 dwt. from a similar quantity. This section of the company's property adjoining Blagrove's is looked upon with much favour, though the two reefs or leaders referred to are dipping into that ground. The company, with the assistance of the County Council, has improved the approaches to the mine, by forming and metalling a dray-road, and the mine is well equipped with all appliances. The shaft has been continued to a depth of 280 ft., and two levels opened, named the 60 ft. and 200 ft. The pumping-engine is an 80-horse power, with two 7-ton Cornish boilers. The draw-lift working-barrel is 13 in., and the plunger-pole 12 in., in diameter. The value of the gold obtained was £35 3s. 6d. Forty-one men were employed.

*Britannia Mine* (Area, 40 acres; owners, Britannia Hauraki Company, Limited).—Operations in this mine were continuing the level opened at the 220 ft. level of the shaft. A reef 1 ft. in width was cut about 280 ft. from the shaft, and driven on for 100 ft. A level was then opened 90 ft. from the surface, and the same reef cut and worked on. The reef, which is gold-bearing, is of sufficient importance to warrant further exploration-work being carried on at this and the low level. Twenty-three men were employed.

*Hauraki South Mine* (Area, 17 acres 1 rood 35 perches; owners, Hauraki South Gold-mining Company).—The shaft commenced last year was sunk to a depth of 150 ft. At that level a chamber was opened out, and a drive commenced which will be continued to the westward to cut the Auckland, Nelson, and Magazine reefs, which are known to run through the ground. The quantity of water was too great for the Worthington pump, and prevented the management from sinking to a greater depth. Fifteen men were employed.

*Blagrove's Freehold Gold-mining Company*.—This company have thirty-eight men employed. The principal works are carried out on the eastern section of the ground, where a small shaft has been sunk to a depth of 125 ft. This shaft is worked by steam-winch where driving, stoping, and rising operations are being carried out on the No. 1 leader, which averages about 6 in., and promises very well. Four tons from this leader were treated some time ago, for a return of 32 oz. of gold. In the main shaft there are only six men employed underground, driving south from the main cross-cut at the 200 ft. level to connect with the eastern shaft. The main cross-cut is in a distance of 540 ft., there being 120 ft. to drive south to make the connection between the two shafts. There has also been a considerable amount of work done on the No. 2 reef, which averages 20 in., and from which fair prospects have been obtained.

*Kathleen Gold-mine (Limited)*.—This company has done a considerable amount of work and discovered a number of reefs from their 200 ft. level cross-cuts driven north and south. The objects of this company are, by prospecting with the available capital in hand, to expose as many reefs as possible, and ultimately to give them a thorough development. Having this in view, the company should eventually turn out a success. It is adjacent to the famous Hauraki Mine, and in line of the belt. The mine is well equipped with permanent plant, so that on this account no more large expenditure will be necessary. The reefs already discovered on the property are some nine in number.

*Golden Pah, Hauraki (Limited).*—This company is engaged developing the 193 ft. level, which is the present depth of the shaft. A new reef is being developed, which promises well. A cross-cut is being driven to communicate with the 180 ft. level from the old Union Beach Mine. In making that intersection it will well ventilate the mine, and also prove two reefs which are ahead of the present forebreast. In the 130 ft., 80 ft., and adit levels, considerable development work is now being pushed ahead, and, from present indications, is likely to yield well. The value of gold sold by this company from 48 tons has been 148 oz., worth £453. The mine is equipped both for pumping and winding on a permanent basis. This company has every prospect of success.

*Hauraki Main Lodes Mine* (Area, 98 acres; owners, Hauraki Main Lodes, Limited).—This mine is situated on the foreshore at Kauri Block, and adjoins the ground owned by the Hauraki Gold-mining Company. The whole of the workings are carried on below high-water mark, and in compliance with the conditions imposed for mining under the sea. Operations have been energetically pursued. Twenty-five men were employed, and the following works carried out:—

**Main shaft:** The shaft, which measures 11 ft. by 7 ft. within timbers, was sunk an additional distance of 40 ft., making total depth 180 ft., water being lifted by a Tangye pump of vertical type, and capable of raising 7,000 gallons per hour. This pump was substituted in place of a smaller one which we found inadequate to cope with inflow of water. A main chamber has been formed at 180 ft. level, size 10 ft. wide, 9 ft. high, and 13 ft. long. On completing chamber main cross-cuts Nos. 1, 2, and 3 were started, and up to the 31st March measured respectively 264 ft., 240 ft., and 71 ft. In driving No. 1 at 214 ft. a large broken quartz lode was met with, bearing north-west and south-east, dip north-east. Drives 4 and 5 were at once commenced on this lode, and up to the 31st March had been driven 51 ft. and 120 ft. respectively, the reef varying in size, being much broken, and not bearing the character of a true reef. The rock encasing this lode is rotten andesite, while beyond it to the south, north-west, and west we have met very hard black rock in each cross-cut. A roadway to ladders a length of 25 ft. has also been driven. Permanent ladders with sollars have been placed the entire depth of the shaft. Cage compartments have been securely divided from pumping-shaft, and the main shaft made a thoroughly secure and permanent work.

**Surface:** The portable winding plant has been removed, and a 10-ton Tangye boiler of Cornish type, with a pair of Tangye's horizontal winding-engines, 16-horse power nominal, together with a pair of Howard's patent safety-cages, with patent safety detaching-hooks, have been supplied and erected. The cages have been fitted with winding-ropes of best crucible steel. Main poppet-heads 60 ft. in height have been erected on a concrete base, and fitted with a pair of 8 ft. pit-head pulleys, to suit winding-rope. Large corrugated-iron shed has been erected over machinery. Shed over temporary winding plant has been converted into a miners' change-room, which, with carpenter's shop, office, and blacksmith's shop and engine-shed, form an efficient working plant. In order to insure the thorough drainage of old workings around the foreshore, our small Tangye pump has been swung into the old Golden Pah shaft, and is working periodically. All the old workings are thoroughly drained.

#### *Preece's Point District.*

*Preece's Point Mine* (Area, 200 acres, freehold; owners, Preece's Point Proprietary, Limited).—During the year the operations in this mine have been of a somewhat limited nature, in consequence of the finances of the company being at rather a low ebb. The mine has been kept free from water, and efforts made to reach the old workings by means of the drainage drive, which is about 30 ft. above sea-level. It was thought that in these old workings the leader might be picked up from which it was reported the former tributaries obtained some rich ore. On the 23rd July these workings were reached, but, the air being so bad, it was necessary to procure thorough ventilation before any examination could be made. This was eventually accomplished, and it was found that, while the main reef runs close by these workings, very little work has been done on it, the former tributaries confining their work to the small specimen leader. This leader and also the main reef have been driven on for a considerable distance, also a winze has been sunk on the reef, and although strong colours and dabs of gold have been seen nothing of a payable nature has come to hand. A few pieces of stone were found showing strong leafy gold. Several other reefs have been found and prospected by means of shallow workings on the surface, and colours of gold often seen. The country is of a good class, heavily charged with arsenical and iron pyrites. An average of sixteen men were employed.

*Golden Shore Special Foreshore Claim* (Area, 137 acres; owners, Golden Shore Gold-mining Company).—A shaft was commenced near high-water mark, and sunk to a depth of 12 ft., of the full size of 16 ft. by 6 ft., but from this depth it has been reduced in size to 6 ft. by 4 ft., and continued to 85 ft., where it is opened out for the purpose of driving a level to cut the reef.

#### *Karaka and Pukemaukuku Blocks.*

Mining operations have not been very energetically carried on in Aitken's Freehold or the adjoining claims.

In the Karaka Block a discovery of rich quartz was made by the company who now own the claims lying between the Success Mine and the Pukemaukuku. The manager, Mr. A. J. Prescott, gives the following account of the work done:—

"The title under which this mine is worked is the Karaka Block Syndicate. It is situated on the western watershed of the main Tokatea Range, being bounded on the north by the Success Mine and on the south by Aitken's Freehold. The name of owner or owners is the Karaka Block Syndicate, and the name of the mine-manager Arthur Joseph Prescott. The area of land held is 450 acres, or thereabouts, comprising Poneke Nos. 1, 2, and 3, Exchequer, Alameda, Standard, and Gordon. Description of mine: Quartz reefs. I may state that during the year the description of the work carried on has been of a prospecting nature, as a result of which several reefs have been discovered, some of which are of a promising nature. The following is a detailed account of the

work which has been done : No. 1 reef (Standard) : Portion of the block has been driven on at No. 1 level a distance of 108 ft. The reef averages from 6 in. to 2 ft. in thickness, and gives fair dish prospects. A winze was also sunk on this reef to a depth of 30 ft. No. 2 level on this reef has been driven a distance of 123 ft. The reef varies in size from a few inches to over 2 ft., and assays taken from here have yielded high value per ton. No. 3 level, on same reef, has been driven a distance of 68 ft.; the reef here also gives fair results. The depth between Nos. 1 and 3 levels is approximately 120 ft. The course of the above reef is north-west and south-east and underlying west. No. 2, or cross-reef, has been driven on about 70 ft., and is running east and west, and averages about 1 ft. in width. This reef gives prospects by dish-washing. Poneke No. 3 section : No. 1 reef has been driven on from No. 1 level a distance of 49 ft. The reef here is merely a few inches thick, but gives a fair prospect. No. 2 level on this reef has been driven north a distance of 100 ft., more or less. The country-rock being of a very hard nature, but favourable for gold, the reef here averages about 6 in. in size, and gives occasional good prospects of loose gold. Further driving has taken place southward on the reef at this level for a distance of 25 ft., with similar results. The depth between Nos. 1 and 2 levels at this point is about 60 ft. A winze was sunk from this level to a depth of 20 ft., the country being of a very hard nature. The reef here gives fair prospects. No. 3, or low level : This level is about 50 ft. below No. 2 level, and has been driven a distance of about 130 ft., the country-rock being of a very hard nature. The reef here gives occasional dish prospects. No. 2 reef : This reef is situated on the north-east portion of the section, and was intersected after driving a distance of 60 ft., and has also been driven on in a northerly direction 80 ft. A winze has been sunk on it to a depth of 60 ft., and a rise put up 25 ft. This reef averages about 6 in. in width, and gives prospects of gold by dish-washing, also by pounding the stone. Poneke No. 2 section—No. 1 reef, or Big reef : This is one of the latest discoveries. The reef is running about north and south, and underlying west. At No. 1 cross-cut this reef was intersected after driving a distance of 40 ft., and giving about 35 ft. of backs. The reef here averages from 4 ft. to 8 ft. in width, the ore being of an auriferous nature. A trial crushing of 5 tons from this level by ordinary wet process yielded 36 oz. 14 dwt. melted gold, valued at about £110. Assays of tailings and slimes made from same yielded as high as £6 per ton. A level was driven north on this reef from cross-cut a distance of 40 ft., and a rise put up 30 ft., the reef maintaining its size throughout. A level was also driven south from cross-cut 28 ft., and a rise put up 25 ft. No. 2, or low-level cross-cut, is about 35 ft. below No. 1 cross-cut. The reef was intersected at this point after driving a distance of 140 ft. through fair shooting rock, and, according to the underlie of the reef, about 98 ft. of backs are available, and increase as driving proceeds north. The reef here is about 3 ft. thick, and is encased in a first-class description of andesite. I may also state that this reef has been cut by surface trenches at intervals for a distance of 15 chains, with very fair results. No. 2 reef on this section is running north-west and south-east, and is nearly vertical, averaging in size from a few inches to 1 ft. I have sunk on this reef a distance of 36 ft., the ore obtained from same showing gold occasionally very freely. No. 3 reef, also in this section, is running north and south. This reef has been driven on in No. 1 level a distance of 50 ft., the amount of backs available from present face being about 30 ft. As driving proceeds north the backs increase. This reef averages here about 18 in. in width, and the prospects obtained are of an encouraging nature. No. 2 level is about 40 ft. below No. 1 level, and after cross-cutting a distance of 50 ft. the reef was intersected. From the point of intersection the reef has been driven on in a northerly direction a distance of 60 ft. The reef here averages from 6 in. to 2 ft. I have also driven south on this reef 30 ft. At this point a rise has been put up about 35 ft. The reef here maintains its size, and ore of good quality is coming to hand. The average number of men employed since starting operations was twelve. I may also state the whole of the above workings have been securely timbered where required."

#### *Matawai District.*

*Progress Castle Rock Mine* (Area, 60 acres).—There has not been much work done in this ground during the year. Four levels are now open on a reef about 18 in. in width. Crushing is recorded as 10 cwt. of stone for 1 oz. 17 dwt. of gold; value, £4 3s. 6d.

#### *Manaia District.*

A limited amount of prospecting has been carried on in this district, but no returns are recorded.

#### *Tiki District.*

*Coromandel Freehold Mine.*—In this mine a considerable amount of work has been done. Ten men were employed, and a trial crushing of 23 tons of stone gave a return of 53 oz. 6 dwt. of gold, valued at £155 18s. 3d.

*Specimen Hill Mine.*—The owners have directed their attention to working the specimen leaders for which this locality has been famous, and 32½ lb. of stone was crushed for a return of 48 oz. 15 dwt. of gold, valued at £144 16s. 6d. Two men were employed.

#### *Kauri Gold Estates Company.*

*Kauri Freehold Gold Estates.*—This company has carried on extensive works during the year. A tramway has been laid from Whangapoua to the mine at Opitonui, and a locomotive engine is employed in conveying material from the landing to the mine. A branch line is also in course of construction up the Oweru Valley. There is also a considerable amount of work being carried on at the mines on the different sections of the property. Several levels are being put in, and two shafts are sunk, on one of which a pumping and winding plant has been erected. The other shaft is being put down for the purpose of connecting the St. Hilda level with this shaft, which has been driven a distance of 520 ft. on a large body of stone which contains a fair percentage of the precious metal. From the

tests made of the different reefs on the property, the superintendent is sanguine that when the works are all completed, and battery working, there will be no doubt as to its ultimate success. Two hundred men are employed.

*Matarangi District.*

Very little work has been done in this locality, and no returns have been published.

*Kuaotunu District.*

*Mariposa Mine* (Area, 101 acres; owners, Mariposa Gold-mining Company, Limited).—A considerable amount of work has been done in this mine during the year—2,382 ft. of driving, 660 ft. of rising work, sinking winzes 200 ft., and sinking main shaft 6 ft. A new reef, called the East lode, has been discovered in a cross-cut driven from No. 2 level, and 300 ft. has been driven on the quartz, which has all proved payable. A cross-cut is being driven at No. 3 level to intersect this reef at a depth of 150 ft. below where it is now worked. During the year the battery has not been continuously employed on account of scarcity of water for the tables and sumps. This has naturally lessened the output from the mine. The quantity of quartz crushed was 4,740 tons, for a yield, by amalgamation, of 834 oz. 8 dwt. of gold, value £1,876 10s. 2d.; and, by the cyanide process, 895 oz. 2 dwt., value £1,901 3s. 6d.: total value, £3,777 13s. 8d. Forty-seven men were employed. It is now imperative to sink a shaft for the purpose of opening the reefs at a greater depth, as the shallower levels will shortly be exhausted. On this matter the mine-manager, Mr. John Goldsworthy, has afforded the following information: "Deep-sinking: From indications at present low level (No. 4) we have every reason to hope that our deep-sinking scheme will be a success. A petition has been forwarded to Government by the townsfolk here praying for a subsidy to assist us to carry out this deep-sinking scheme with greater facility; we have also made formal application for the same. Mine machinery: Of this we have none at present, but there is on the way from Home a consignment of machinery consisting of steam pumping and winding plant for use in our deep-sinking scheme. We can at this juncture give no plans or particulars; we are not in possession of same. We are making preparations for the deep-sinking. A large chamber has been cut out at No. 4 level and timbered; the main shaft sunk to a depth of 6 ft.; smoke-passage, rope-passage, and rise for poppet-heads are all but completed. The steam plant will be underground, in this chamber." The Jupiter Mine is now owned by this company.

*Irene Mine* (Area, 57 acres; owners, Irene (Hauraki) Gold-mines, Limited).—A considerable amount of work was carried on during the year. 1,050 ft. was driven on the strike of the Try Fluke reef, and 300 ft. of cross-cutting. A hundred tons of quartz crushed at the Great Mercury Mine yielded, by amalgamation, 27 oz. 10 dwt., value £58 1s. 10d.; and, by the cyanide process, 15 oz. 13 dwt., value £23 13s. 5d.: total value, £81 15s. 3d. An average of ten men were employed.

*Kapai-Vermont Mine* (Area, 35 acres 2 roods 30 perches; owners, Kapai-Vermont Gold-mining Company, Limited).—This mine is the most southerly of the gold-producing mines on the line of the Try Fluke reef, and hitherto has been worked from levels. During the past year the development works have been somewhat limited. The main low level (No. 3), at a depth of 308 ft., is now in a distance of 790 ft., the reef averaging about 2½ ft., but during the extension of the last 300 ft. the ore obtained has not been payable. A cross-cut going east was commenced at a point 360 ft. along the line of reef in the low level, with the object of intersecting any lodes that might traverse the property in that direction, but after a distance of 132 ft. had been penetrated this was discontinued, nothing of an encouraging nature having been met with. With the exception of the works above mentioned, the operations have been almost entirely confined to stoping out the block between No. 2 and No. 3 levels. This has been exhausted, and further development by sinking is now necessary. The manager is awaiting the instruction of the Board of Directors to proceed with the sinking of a shaft on the underlie of the reef to a depth of 300 ft. When this work is carried out there is every hope that the mine will again take a prominent place among the bullion-producers. The quantity of quartz crushed during the year amounted to 3,027 tons, for 2,048 oz. of gold; value, £4,668 8s. This was all recovered by the cyanide process. The cost of mining the quartz was 8s. 11d., and the cost of milling and treatment 15s. 9d., per ton. The number of men employed was twenty-nine in mine and mill.

*Waitaia Mine* (Area, 85 acres 2 roods; owners, Waitaia Gold-mines, Limited).—A large amount of work has been done in mine development during the year—1,807 ft. of driving on reefs, 341 ft. of cross-cutting, and 192 ft. sinking and rising. No bulk of quartz has been crushed pending the erection of a mill on the company's own account, but a parcel of specimens gave a return of 14 oz. 19 dwt. of gold; value, £40 14s. 9d. Twenty men were employed.

*Juno Mine* (Area, 28 acres; owners, Juno Gold-mining Company).—Two men were employed during the year. Twenty-five tons of quartz was crushed, for a yield of 19 oz. 5 dwt.; value, £55 16s. 6d.

Prospecting work was also done in the Invicta, Handsworth, Golden Anchor, Aorere, and other mines, but no yield of gold has been recorded.

*Great Mercury Mine.*—Operations are confined to the Red Mercury section of the mine. The lodes under development are three in number—viz., Just in Time, Red Mercury, and Foot-wall Reef. The ore-bodies vary from 6 in. up to 2 ft. in thickness, and are very patchy in character; and, as a result, the stone has to be selected. The ore is free-milling, and in consequence there is no trouble with the cyanide process. The extraction is from 85 to 90 per cent., and the cost of treatment is 4s. 10d. per ton. 470 tons of quartz and 433 tons of tailings have lately been treated, for 332 oz. of gold. Sixteen men have been employed in the mine and battery.

*Mercury Bay District.*

Prospecting operations have been carried on in the Moehau and Mahakirau districts, and, in order to enable the miners to test any quartz, the Government is about to erect a small crushing plant for that purpose.

*Boat Harbour District.*

The claims which were taken up in this part have not been worked during the year.

*General Remarks.*

The Royal Oak, Hauraki Associated Reefs, Kapanga, and the Hauraki Mine have been the chief gold-producers, and have been vigorously worked.

At Kuaotunu the Try Fluke (now Mariposa), Great Mercury, and Kapai-Vermont Mines did not yield rich returns, and deeper working must be resorted to in this district.

The Kauri Gold Estates Company have carried on extensive works, with fair prospects of success.

**THAMES DISTRICT.**

The mining operations in this district have been of a developmental character, and large amounts have been expended on the erection of machinery, especially for mining at deep levels.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Thames.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
21/11/95	A. R. P.	Thames ..	IV., V.	Thames ..	Adelaide ..	The Adelaide Gold-mining Co. (N.L.).
23/12/96	99 0 0	Waiomo ..	II.	Thames ..	Adeline ..	Simon Fraser.
1/3/96	58 2 10	Tairua ..	IX.	Tairua ..	Ajax ..	Finlay McLiver.
14/12/96	61 3 5	Waiomo ..	II.	Thames ..	Ake Ake ..	Ake Ake Gold-mining Co. (N.L.).
14/12/96	100 0 0	Whangamata ..	VIII., XII.	Tairua ..	Alameda ..	Henry James Ross.
3/2/97	100 0 0	Gum Town..	IV.	Whitianga	Albion ..	Walter Calloway.
6/4/96	71 2 18	Thames ..	"	Thames ..	Alburnia East	The Alburnia East Gold-mining Co.
27/2/96	68 1 0	" ..	"	" ..	" ..	The Seven Reefs Gold-mining Co.
27/2/96	68 1 0	Punga Flat..	"	" ..	Alburnia Extended..	John William Ryan.
6/7/97	27 0 0	Tararu ..	I.	" ..	Alexander ..	Alexander McLeod Cowie.
27/2/96	82 0 3	" ..	V.	" ..	Alpine ..	Francis Angus White.
25/6/96	98 2 7	Puriri ..	XIII.	" ..	Amazon ..	Golden Centre Gold-mining Co.
13/11/95	96 2 0	Thames ..	V.	" ..	Anchor ..	Adolph Kohu.
24/4/96	99 0 24	Puriri ..	XIII.	Tairua ..	Apakura ..	W. J. Nevill.
21/12/95	100 0 0	Waiomo ..	I.	Thames ..	Argosy ..	Argosy Gold-mining Co. (N.L.).
26/3/96	77 2 0	Thames ..	"	" ..	Argosy Extended	" ..
18/2/98	31 2 32	Tairua ..	V.	Tairua ..	Argentine ..	Charles McLean.
5/5/97	90 3 25	Puriri ..	XIII.	Thames ..	Auckland Brokers	Henry Culpin.
11/9/97	99 2 22	" ..	"	" ..	Aurarius ..	Robert Worth.
24/7/97	92 2 0	" ..	"	" ..	Averna ..	A. H. Wyld and R. Leary.
3/2/97	64 2 0	Waiomo ..	XIV.	Hastings ..	Athens ..	Charles White Cave.
23/12/96	100 0 0	Whangamata ..	XIV., XV.	Tairua ..	Azteco ..	John Morrison.
24/8/97	26 0 12	Waiomo ..	XI.	Hastings ..	Baliade ..	Hugh Owen.
10/5/97	90 0 3	Tararu ..	I.	Thames ..	Balmoral ..	Ernest Clifton Beale.
15/2/97	54 2 0	Tapu ..	XI.	Hastings ..	Band ..	John Ward.
19/9/96	100 0 0	Tararu ..	II.	Thames ..	Bankers ..	Simon Fraser.
18/2/97	16 1 23	" ..	"	" ..	Beehive ..	John Hague Smith.
6/12/95	79 3 0	Thames ..	V.	" ..	Bell Rock ..	The Bell Rock Gold-mining Co. (N.L.).
29/4/97	100 0 0	Waiomo ..	XIV.	Hastings ..	Belterbet ..	George Samuel Graham.
29/4/97	99 2 0	Tairua ..	XIII.	Tairua ..	Bernice ..	Joseph William Day.
24/4/96	98 3 2	Waiomo ..	XV.	Hastings ..	Big Reef ..	Arthur Wright.
18/2/97	20 1 10	Whangamata ..	II.	Ohinemuri	Black Bess	Frederick Shaw.
8/4/97	10 1 0	Waiomo ..	XIV.	Hastings ..	Black Douglas	Andrew Dewar Douglas.
22/9/96	76 0 0	Ohui ..	IV.	Tairua ..	Bonanza No. 1	George Bigg Withers.
18/5/96	51 1 20	Waiomo ..	XV.	Hastings ..	Boss ..	Ernest Mansfield.
23/11/97	49 0 0	Tairua ..	II., VI.	Tairua ..	Bourbon ..	James Welman.
11/3/96	100 0 0	" ..	VI.	" ..	Broken Hills	Broken Hills Gold-mining Co. (Ltd.)
25/4/96	98 2 0	" ..	"	" ..	Broken Hills Ext.	Charles Rhodes and others.
29/5/96	100 0 0	" ..	"	" ..	Broken Hills No. 2.	Broken Hills No. 2 Gold-mining Co.
29/5/96	69 3 24	" ..	"	" ..	Broken Hills No. 3.	Broken Hills Gold-mining Co. (Ltd.).
29/5/96	70 3 26	" ..	"	" ..	Broken Hills No. 4.	" ..
23/8/97	100 0 0	Tapu ..	XIV.	Hastings ..	Broken Hill	Broken Hill Gold-mining Co. (Ltd.).
24/7/97	100 0 0	Hape Creek..	V.	Thames ..	Caledonian No. 2	John Childerhouse.
9/8/88	15 2 17	Thames ..	IV.	" ..	Camabria ..	Anglo-Continental Gold Syndicate (Limited).
23/3/97	100 0 0	Tararu ..	I., II.	" ..	Cameron ..	James George Wilson.
29/4/97	99 3 30	Te Mata ..	VII.	Hastings ..	Canadian ..	Thomas Morrin and Robert Kelly.
5/8/97	92 0 0	Tairua ..	IX.	Tairua ..	Captain Argall	Percy Adolphus Vaile.
6/7/97	8 3 16	" ..	IX.	Thames ..	Captain Argall Ex-	" ..
16/11/97	3 2 0	Thames ..	IV.	Tairua ..	tended	" ..
3/5/95	64 2 0	" ..	"	Thames ..	Cardigan Extended..	David Cole Gash.
6/2/96	8 1 0	Ohui ..	"	" ..	Cardigan ..	The Cardigan Gold-mining Co. (Ltd.).
7/6/97	78 0 0½	Tairua ..	XIII.	Tairua ..	Carnation ..	Henry Becker.
23/7/96	100 0 0	Whangamata ..	III.	Thames ..	Carnival ..	John C. Webster.
19/12/95	20 1 16	Thames ..	IV.	Ohinemuri	Cascade ..	Henry William Moore.
31/3/98	100 0 0	Tapu ..	XI.	Thames ..	Caspian ..	Caspian Gold-mining Co. (N.L.).
3/3/96	69 0 0	Kirikiri ..	IX.	Hastings ..	Chamberlain	Frederick Earl.
6/2/96	11 2 20	Tararu ..	II.	Tairua ..	Chester ..	Malcom Fleming.
16/3/98	100 0 0	" ..	"	Thames ..	Chicago ..	William Duncan Pearce.
14/9/95	99 2 23	" ..	I.	" ..	" ..	William Nicol Macbeth.
14/11/96	67 0 27	Thames ..	V.	" ..	City of Auckland	City of Auckland Gold-mining Co. (Ltd.).
15/12/97	43 1 39	Punga Flat..	IV.	" ..	City of London	City of London Gold-mining Co. (N.L.).
22/9/96	50 0 0	Tapu ..	XI.	" ..	Clarence Berry	Charles Short.
11/4/95	16 0 0	Thames ..	IV.	Hastings ..	Club ..	Club Gold-mining Co. (N.L.).
				Thames ..	Clunes ..	The Clunes Gold-mining Co. (N.L.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
4/3/96	A. R. P.	Tairua ..	IX., X.	Tairua ..	Colossus ..	George S. Budge.
23/3/97	100 0 0	Whangamata	XIII.	" ..	Collegian ..	Richard Jabez Dunn.
10/5/97	45 2 0	Tairua ..	IV.	" ..	Columbine ..	Thomas Pelly Pockorage Seaver.
29/4/97	97 2 32	" ..	XIV.	" ..	Commodore ..	Percy Adolphus Vaile.
2/11/96	45 2 15	Tapu ..	XI.	Hastings ..	Comet ..	Comet Gold-mining Co. (N.L.).
13/11/95	96 3 9	Waiomo ..	XV.	" ..	Comstock ..	The Comstock Gold-mining Co. (Ltd.).
8/2/96	100 0 0	Thames ..	IV.	Thames ..	Conservative ..	The Conservative Gold-mining Co.
12/3/96	86 3 12	Tairua ..	IX.	Tairua ..	Consolation ..	John Morrow.
23/3/97	85 2 10	Whangamata	XIII.	" ..	Coolreagh ..	George Crosby.
6/4/96	69 1 7	Thames ..	IV.	Thames ..	Creek ..	Tararu Creek Gold-mining Co.
24/7/97	77 0 16	Tairua {	IX., XIII.	Tairua {	Criterion No. 1 ..	Harmood Arthur Banner.
11/9/97	92 3 37	" ..	IX.	Thames {	Criterion No. 2 ..	"
24/7/97	78 1 16	" ..	XIII.	Tairua {	Criterion ..	"
4/6/97	91 0 0	" ..	VIII.	Thames ..	Crompton ..	Robert Crompton Speer.
4/10/95	64 2 10	Thames ..	IV., V.	Thames ..	Cumberland ..	John Bowler.
1/2/96	28 0 0	" ..	" ..	" ..	Cumberland Ext. ..	Karaka Queen Gold-mining Co.
27/2/96	100 0 0	Waiomo ..	II.	" ..	Daphne ..	Joseph Barber and T. Millett.
21/1/97	7 3 15	Thames ..	IV., V.	" ..	Darwin ..	Darwin Gold-mining Co. (N.L.).
29/4/97	99 3 0	Te Mata ..	VII.	Hastings ..	Darwin No. 1 ..	Thomas Morrin and Robert Kelly.
22/11/97	25 3 10	Tairua ..	" ..	Tairua ..	Dawn of Hope ..	Robert Worth.
27/9/97	97 2 0	" ..	IX.	" ..	Dawn of Light ..	Alfred H. Wyld and Richard Leary.
16/1/96	20 2 32	Tairua ..	" ..	Tairua ..	Day Dawn ..	The Day Dawn Gold-mining Co. (N.L.).
14/9/95	90 0 0	Thames ..	IV.	Thames ..	Deep Levels Con- solidated	Thames Hauraki Goldfields (Ltd.).
14/8/95	67 1 0	Thames ..	XXVII.	Thames ..	Deep Sinker ..	Thames Hauraki Goldfields (Ltd.).
16/7/96	3 0 50	Tairua ..	II.	Tairua ..	Despised ..	William Bloomfield.
27/2/96	62 0 0	Whangamata	III.	Ohinemuri	Dictator ..	Robert Comar.
11/3/96	81 3 11	Waiomo ..	XV.	Hastings ..	Digger's Dream ..	Jeffrey Murdock.
8/11/97	97 0 0	Tararu ..	IV.	Thames ..	Dixon's Consolidated	Arthur Wright and James B. Blaikie.
24/6/97	76 2 0	" ..	I.	" ..	Don Giovanni ..	Ewen William Allison.
24/6/97	48 0 0	" ..	" ..	" ..	Don Juan ..	"
24/7/97	100 0 0	Matatoki ..	XIII.	" ..	Dover Castle ..	Dover Castle Gold-mining Co.
24/4/96	46 0 20	Thames ..	V.	" ..	Duplex Extended ..	Robert Orr Young.
2/11/96	96 3 12	Waiomo ..	I.	" ..	Eaglehawk ..	Eaglehawk Gold-mining Co. (N.L.).
27/8/96	12 0 26	" ..	II.	" ..	Eclipse ..	W. H. Buckley and James Onion.
23/12/96	98 2 0	Puriri ..	XIII.	" ..	Eclipse No. 1 ..	John Manners Morran.
14/12/97	16 0 0	Tararu ..	II.	" ..	Eclipse Extended ..	Harry Sidney Smith.
8/11/97	62 2 0	Whangamata	III.	Tairua ..	Eileen ..	Hauraki Peninsula Exploration Co. (Ltd.).
20/8/96	27 1 3	Thames ..	IV.	Thames ..	Ellerslie ..	John Churton.
11/9/97	59 2 0	Puriri ..	XIII.	Tairua ..	Empress ..	London and New Zealand Exploration Co. (Ltd.).
23/3/97	85 0 37	" ..	V.	Ohinemuri	Empress of India ..	Alfred Rhodes.
12/8/96	100 0 0	" ..	XIII.	Thames {	"	"
4/3/97	24 2 0	Whangamata	IV.	Tairua {	Energetic ..	Thomas Scanlan.
22/11/97	32 0 5	Tararu ..	I.	Waihou {	"	"
6/4/96	50 0 0	Thames ..	V.	Ohinemuri	"	"
18/6/96	30 0 0	Puriri ..	VIII.	Tairua ..	Engagement ..	Henry David Abbott.
25/10/95	100 0 0	Thames ..	I.	Thames ..	Essie ..	William Henry Thompson.
3/3/96	45 0 0	Kirikiri ..	V.	" ..	European ..	The European Gold-mining Co.
11/9/97	68 1 0	Hape Creek ..	XIII.	Tairua ..	Fair Alice ..	The Apakura Syndicate (Ltd.).
28/2/95	6 1 10	Thames ..	IV.	Thames ..	Favourite ..	John Watson Walker.
29/5/96	92 0 0	Puriri ..	IX.	Tairua ..	Filly ..	Malcolm Fleming.
23/12/96	98 0 35	The Wires ..	IV., V.	Thames ..	Fortuna ..	Fortuna (Hauraki) Gold-mines (Ltd.).
23/12/96	74 2 0	Tairua ..	IV.	" ..	Freedom ..	The Freedom Gold-mining Co. (N.L.).
23/11/97	29 3 12	" ..	XIII.	" ..	Frenchman ..	John Hague Smith.
6/2/96	30 0 0	Tapu ..	I., II.	Ohinemuri	Gagool ..	Christopher G. Walker.
6/7/97	15 3 23	Te Mata ..	II.	Tairua ..	Galatea ..	R. Ross McGregor and Henry Culpán.
18/2/98	93 2 25	Tairua ..	V., VI.	" ..	Gem ..	William Gorrie.
2/9/97	7 1 22	" ..	XI.	Hastings ..	Gem and Crown ..	The Monowai Gold-mines (Ltd.).
23/3/97	97 0 0	Karaka ..	VII.	" ..	Gentle Lizzie ..	Elizabeth Brain.
16/3/98	88 2 6	" ..	VI.	Tairua ..	Glencoe ..	Herbert Gordon and Albert Bruce.
10/5/97	42 0 20	Tapu ..	" ..	" ..	Glentanner ..	Montague H. Wynyard.
24/4/96	5 2 18	Waiomo ..	V.	Thames ..	Gloucester ..	Gloucester Gold-mining Co.
20/3/96	2 2 20	Tairua ..	" ..	" ..	Gloucester Extended	(Ltd.).
28/7/96	100 0 0	Tapu ..	XI.	Hastings ..	Golden Age ..	Andrew Dewar Douglas.
21/1/97	30 0 0	Tairua ..	IX.	Thames ..	Golden Argosy ..	The Argosy Gold-mining Co.
29/5/96	100 0 0	Puriri ..	XI.	Tairua ..	Golden Arrow ..	Lachlan McLiver.
25/4/96	97 1 20	Whangamata	IX.	Hastings ..	Golden Band ..	The Golden Band Gold-mining Co.
18/2/98	34 2 6	Tairua ..	IX.	Tairua ..	Golden Belt ..	Finlay McLiver.
21/12/95	100 0 0	Ohui ..	XIII.	Thames ..	Golden Centre ..	Golden Centre Gold-mining Co.
5/9/95	21 0 20	Tapu ..	III.	Ohinemuri	Golden Falls ..	Henry W. Moore.
8/2/96	100 0 0	Whangamata	VI.	Tairua ..	Golden Hill ..	Robt. Worth, W. D. Tilsey, and Thos. Davy.
25/6/96	43 0 32	" ..	IV.	" ..	Golden Horn ..	J. C. P. Seaver.
27/8/96	100 0 0	Tairua ..	XII.	Hastings ..	Golden Mount ..	Golden Horn Gold-Mining Co. (Ltd.).
8/11/97	29 0 0	" ..	III.	Ohinemuri	Golden Mount Ext.	James Reid and others.
15/2/97	100 0 0	Tapu ..	XV.	Tairua {	"	Robert Butler Lusk.
19/8/96	46 3 35	Whangamata	II.	Thames ..	Golden Planet ..	Golden Planet Gold-mining Co. (N.L.).
2/11/96	37 0 35	" ..	VI.	" ..	Golden Point ..	Herbert Gordon.
10/9/96	7 3 0	" ..	XI.	Hastings ..	Golden Reef ..	George H. McMahon.
			XV.	Tairua ..	Golden Three Reefs	Thomas Percy Vulgar.
			III.	Ohinemuri	Golden Wave No. 2	George Millar Cameron.
			" ..	" ..	Golden Wave No. 3	"



ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at  
THAMES—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim	Name of Registered Owner.
11/9/97	A. R. P.	Puriri ..	XIII.	Thames ..	Goldfield ..	Robert Worth.
29/4/97	64 2 0	Tairua ..	XIV., XV.	Tairua ..	Goth ..	James Welman.
19/9/96	58 3 8	Whangamata ..	III.	Ohinemuri ..	Grand Coup ..	Tamihana Gold-mining Co. (N.L.)
2/11/96	71 2 29	Tararu ..	II.	Thames ..	Grosvenor ..	Earnest C. Beale.
22/9/96	50 3 15	Tapu ..	XI.	Hastings ..	Guiding Star ..	Peter Norbury.
19/9/96	84 2 9	Waiomo ..	I.	Thames ..	Happy Thought ..	Golden Opportunity Gold-mining Co.
21/11/95	100 0 0	Ohui ..	IV.	Tairua ..	Harp of Tara ..	Harp of Tara Gold-mining Co.
24/7/97	30 0 0	Waitohi ..	.	Thames ..	Hauraki Golden Age ..	Hauraki Golden Age Mines (Ltd.).
4/6/97	71 3 29	Tapu ..	XI.	Hastings ..	Hector ..	Andrew Dewar Douglas.
22/11/97	47 2 35	Tairua ..	VI.	Tairua ..	Hidden Treasure ..	William Armstrong.
5/8/97	25 2 24	Kauaeranga ..	I.	..	Hihi ..	Balfour, Nixon, and others.
7/6/97	100 0 0	Tararu ..	.	Thames ..	Hillside ..	Allan Cameron Stewart.
25/4/96	70 0 0	Thames ..	V.	..	Hilton ..	Earnest C. Beale.
3/8/96	100 0 0	Kirikiri ..	IX.	Tairua ..	Horseshoe ..	Malcolm Fleming.
11/8/96	82 0 0	Whangamata ..	XV.	..	Inca No. 1 ..	Inca Gold-mining Co. (N.L.).
15/2/97	87 3 35	Puriri ..	XIII.	Thames ..	Inverness ..	E. Thomas Dufaur and James Russell.
8/11/97	100 0 0	Whangamata ..	III.	Tairua ..	Ivy ..	Hauraki Peninsula Exploration Co. (Ltd.).
4/10/95	97 0 0	Puriri ..	XIII.	Thames ..	Joker ..	Jules George Wilson.
24/7/97	99 1 0	Tapu ..	XI.	Hastings ..	Jessie ..	Robert Patterson.
5/8/97	52 0 0	Kauaeranga ..	I.	Tairua ..	Joselyn Davis ..	Balfour, Nixon, and others.
23/8/97	79 2 1	Whangamata ..	XIII.	..	Julius Caesar ..	Ernest Mansfield.
27/8/96	100 0 0	"	II., III.	Ohinemuri ..	Junction Whangamata No. 1 ..	Joseph Bishop.
11/7/95	35 3 36	Tararu ..	I., IV.	Thames ..	Kaiser ..	The Kaiser Gold-mining Co. (N.L.).
23/12/96	49 3 25	Tairua ..	VI.	Tairua ..	Kathleen ..	New Year Gold-mining Co. (N.L.).
18/11/95	34 0 0	Thames ..	IV.	Thames ..	Karaka Mines ..	C. A. Harris.
2/9/97	84 3 20	Tairua ..	VI.	Tairua ..	Kauri ..	John Alexander Robertson.
25/6/96	4 0 8	Thames ..	V.	Thames ..	Kedge ..	Adolph Kohn.
5/8/97	100 0 0	Waiomo ..	XI., XIV.	Hastings ..	Kensington ..	Hugh Owen.
10/5/97	100 0 0	Tararu ..	I.	Tararu ..	" ..	Ernest Clifton Beale.
23/8/97	64 0 0	Thames ..	V.	Waiomo ..	Kent ..	William Shaw.
4/3/97	12 0 30	Tapu ..	XI.	Hastings ..	Key of Tapu ..	Joseph Barber.
23/3/97	90 0 0	Whangamata ..	XIII.	Tairua ..	King Dick ..	Percy Spencer.
27/2/96	66 3 0	Whangamata ..	III.	Ohinemuri ..	King of Whangamata ..	The King of Whangamata Gold-mining Co.
15/2/97	100 0 0	Whangamata ..	III., VII.	Tairua ..	King of Tairua ..	Edward J. Smith.
6/7/97	29 3 32	Thames ..	..	Thames ..	Kuranui Caledonian ..	Kuranui Caledonian Gold-mining Co. (Ltd.).
16/5/89	14 3 10	Waiomo ..	IV.	..	Kuranui No. 3 ..	Kuranui Gold-mining Co. (Ltd.).
29/5/96	100 0 0	Waiomo ..	XV.	Hastings ..	Kuvera ..	Eric Manley Clark.
21/1/96	39 0 0	Ohui ..	IV.	Tairua ..	Kuvera Extended ..	Edward Weston Andrews.
21/12/95	30 0 0	Tairua ..	IX.	Thames ..	Last Chance ..	J. C. B. P. Seaver.
4/8/96	94 0 23	Thames ..	V.	Thames ..	Light of Asia ..	George S. Budge.
21/12/95	50 0 0	Tairua ..	IV., VI.	Ohinemuri ..	Limerick ..	John Childerhouse.
23/3/97	100 0 0	Shellback Creek	IV.,	Thames ..	Lindauer ..	John Jesse Oldham.
21/9/97	4 2 13	Puriri ..	XIII.	..	Little Mary ..	William Cornes.
24/7/97	79 3 35	Waiomo ..	XIV.	Hastings ..	Little Nell ..	Albert Kummert.
8/4/97	46 2 20	Thames ..	II.	Thames ..	Little Wonder ..	Richard Leary.
25/9/96	8 1 18	Thames ..	IV.	Tairua ..	Lomas ..	James Darrow.
14/6/89	86 0 20	Whangamata ..	XV.	Tairua ..	Lone Hand ..	The May Queen Hauraki (Ltd.).
26/2/96	27 3 35	Waiomo ..	I.	Thames ..	Luck at Last ..	Whangamata Proprietary (Ltd.).
26/2/96	100 0 0	Thames ..	IV.	..	Luck at Last Ext. ..	William Shaw
3/2/97	100 0 0	Thames ..	IV.	..	Lysander ..	Magazine Gold-mining Co.
20/3/96	16 3 17.6	Tapu ..	XI.	Hastings ..	Magazine ..	Magazine West ..
31/7/96	27 0 16	Tairua ..	XX.	Tairua ..	Mahara ..	Mahara Royal (Ltd.).
19/6/95	100 0 0	Thames ..	V.	Thames ..	Main Lead Extended ..	Frederick John Tiffin.
3/8/96	26 2 22	Ohui ..	IV.	Tairua ..	Manchester ..	William McCullough.
21/12/95	100 0 0	Waiomo ..	I.	Thames ..	Maori Land ..	T. P. P. Seaver.
2/7/96	30 0 0	Whangamata ..	III.	Ohinemuri ..	Mararoa ..	The Golden Opportunity Gold-mining Co.
25/6/96	100 0 0	Ohui ..	IV.	Tairua ..	Mararoa No. 2 ..	Maroo Polo Gold-mining Co.
2/11/96	100 0 0	Thames ..	IV.	..	Marquita ..	George Dunnett.
6/2/96	5 0 36	Thames ..	V.	Thames ..	Marigold ..	Arthur O. Field.
6/12/95	57 3 32	Mata ..	VII.	Hastings ..	Mascotte ..	John Childerhouse.
19/8/96	36 1 14	Tairua ..	II.	Tairua ..	Mata Prospectors ..	Daniel McCafferty.
23/7/96	100 0 0	Karaka ..	IV.	Thames ..	Mataura ..	Tairua Prospecting Gold-mining Co. (N.L.).
5/5/97	49 1 30	Thames ..	IV.	Tairua ..	May Queen ..	May Queen Extended Gold-mining Co.
27/8/94	73 1 18	Ohui ..	IV.	Tairua ..	Maori Dream ..	May Queen Hauraki (Ltd.).
8/11/97	55 0 26	Tairua ..	XIII.	Thames ..	Mar Saba ..	Maori Dream Gold-mines (Ltd.).
8/11/97	100 0 0	Whangamata ..	III.	..	Marguerite ..	Hauraki Peninsula Exploration Co. (Ltd.).
4/6/97	50 0 0	Puru ..	XIV., XV.	Hastings ..	Matakana ..	William James Pearce.
22/11/97	100 0 0	Tairua ..	II., VI.	Tairua ..	Mauritius ..	James Welman.
22/11/97	38 0 0	..	I., II., V., VI.	..	Mauritius Extended ..	..
27/9/97	58 1 29	Gum Town ..	XIV.	Thames ..	McIsaacs ..	McIsaacs Gold-mining Co.
6/4/96	100 0 0	Tairua ..	II.	Whitianga ..	Merry England ..	George McNeil.
23/12/96	97 0 0	Whangamata ..	XV.	Tairua ..	Micawber ..	Joseph Barber and Robert Kelly.
29/5/96	86 3 28	..	III.	Ohinemuri ..	Mikado ..	Benjamin H. Bishop.
23/12/96	59 0 0	Tairua ..	II.	Tairua ..	Minnesota ..	Wentworth Gold-mining Co. (N.L.)
2/11/97	4 0 0	..	..	..	Missing Link ..	Albert Gold-mining Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
4/2/97	A. R. P.	Waiomo ..		Tham ..	Mistletoe ..	John Wigmore.
27/2/96	9 1 4	Whangamata ..	XV.	Tairua ..	Moa ..	Moa Gold-mining Co. (Ltd.).
10/11/96	94 8 26	Thames ..	IV.	Thames ..	Moanataiari ..	Moanataiari Gold-mining Co. (Ltd.).
24/10/95	12 0 89	" ..	IX.	" ..	Moanataiari North ..	Moanataiari North Gold-mining Co.
5/3/96	27 2 0	" ..	IV.	" ..	Moanataiari Ext. ..	Moanataiari Ext. Gold-mining Co.
7/6/97	96 0 0	Tararu ..	I., II.	" ..	Moir ..	Allan Cameron Stewart.
7/6/97	41 1 0	" ..	I.	Tararu ..	Moonbeam ..	Reubens Kerry.
4/5/97	22 2 10	" ..	" ..	Thames ..	Moonlight ..	Thomas Cottle.
4/6/97	54 3 0	" ..	II.	" ..	Moor of Venice ..	Grosvenor United Gold-mining Co. (Ltd.).
9/3/95	57 3 39	Waiomo ..	XV.	Hastings ..	Monowai ..	Monowai Gold-mines (Ltd.).
19/8/96	74 0 31	" ..	III.	Thames ..	Morion ..	Morion Puru Gold-mining Co.
23/4/97	10 1 19	Tararu ..	II.	" ..	Morion Extended ..	Morion Puru Gold-mining Co. (Ltd.).
23/6/96	80 0 0	" ..	I., II.	" ..	Mount Taylor ..	Thomas Millet and Ernest C. Beale.
23/3/97	85 0 0	" ..	" ..	" ..	Mount Taylor Ext. ..	Mount Taylor Gold-mining Co.
21/11/95	11 3 0	Ohui ..	IV.	Tairua ..	My Daisy ..	John Patrick Ward.
2/9/97	21 2 10	Tairua ..	I., VI.	" ..	Myosotis ..	Benjamin M. Myers.
29/10/96	16 3 25	Whangamata ..	XV.	" ..	Nellie ..	The Nellie Gold-mining Co. (N.L.).
7/6/97	70 0 16	Puriri ..	XIII.	Thames ..	Never Despair ..	George Bedford.
27/9/97	98 0 0	Waiomo ..	XIV.	Hastings ..	New Alma ..	Edward Byers Sealy.
4/10/95	54 2 0	Thames ..	IV.	Thames ..	New Alburnia ..	New Alburnia Gold-mining Co. (Ltd.).
3/2/97	91 2 20	Waiomo ..	XV.	Hastings ..	New Boss ..	Boss Gold-mining Co. (N.L.).
5/8/97	78 0 8	Tairua ..	XIII.	Tairua ..	New Chicago ..	Charles Foster Wigley.
16/11/97	9 1 20	Punga Flat ..	IV.	Thames ..	New Eileen ..	New Alburnia Gold-mining Co. (Ltd.).
18/5/97	22 0 0	Karaka ..	" ..	" ..	New Hauraki No. 1 ..	James McNeil Agnew.
24/7/97	73 0 0	Whangamata ..	XV.	Tairua ..	New Leap Year ..	William Prebble.
10/5/97	100 0 0	Waiomo ..	XIV.	Hastings ..	New Mount Zeehan ..	William Read Bloomfield.
10/5/97	100 0 0	Whangamata ..	II., III.	Ohinemuri ..	New Oceola ..	Henry William Moore.
26/4/97	100 0 0	Puru ..	I.	Thames ..	New Olive ..	Rowland Campion Long.
28/7/96	97 3 7	Boat Harbour ..	VI.	Tairua ..	New Tairua ..	Thomas P. Seaver.
27/8/96	100 0 0	Whangamata ..	III.	Ohinemuri ..	New Wentworth ..	Wentworth Gold-mining Co. (N.L.).
6/4/96	52 0 5	Thames ..	IV.	Thames ..	New Whau ..	The New Whau Gold-mining Co.
19/2/97	59 0 27	Puriri ..	XIII.	Tairua ..	Never Miss ..	Robert Worth.
23/3/97	85 3 24	Whangamata ..	IV.	" ..	Nil Desperandum ..	Nil Desperandum Gold-mining Co.
1/10/96	21 0 0	Thames ..	" ..	Thames ..	Nonpareil ..	Nonpareil Gold-mining Co. (N.L.).
2/11/96	59 0 0	" ..	IV., V.	" ..	Occidental ..	Occidental Gold-mining Co. (N.L.).
27/9/97	100 0 0	Whangamata ..	XV.	Tairua ..	Old Newton ..	John Cunningham.
11/3/96	36 3 28	Thames ..	V.	Thames ..	Only Chance ..	Thomas Boyle.
21/3/99	15 0 0	" ..	IV.	" ..	Orlando ..	The Orlando Gold-mining Co. (Ltd.).
4/6/97	52 0 0	Tararu ..	I.	" ..	Oruba ..	George Bertram Hutton.
17/8/95	100 0 0	Tairua ..	IX.	Tairua ..	Pakirarahi ..	James McKay, jun.
21/12/95	97 1 11	" ..	IX.	" ..	Pakirarahi No. 1 ..	George Frederick Bell.
21/12/95	91 0 0	" ..	" ..	" ..	South ..	" ..
5/3/96	10 1 0	Waiomo ..	XV.	Hastings ..	Park ..	T. A. Dunlop.
11/3/96	62 3 37	Tairua ..	IX.	Tairua ..	Perseverance ..	John Moore.
6/2/96	25 0 20	" ..	" ..	" ..	Perseverance Ext. ..	John Morrow.
29/5/96	36 2 26	Whangamata ..	III.	Ohinemuri ..	Phoenix Extended ..	Newell Butler Lusk.
23/12/96	99 3 14	Puriri ..	XIII.	Tairua ..	President ..	Albert Spencer.
17/10/95	100 0 0	Tairua ..	III.	" ..	Prince Charlie ..	Charles McLean.
24/7/97	50 3 0	Whangamata ..	XV.	Tairua ..	Princess of Wales ..	Patrick E. Ryan.
29/5/96	30 0 2	The Wires ..	II., III.	Ohinemuri ..	Pukewhan Ext. ..	Benjamin Anderson.
27/2/96	100 0 0	Puriri ..	XIII.	Tairua ..	Puriri ..	The Puriri Gold-mining Co. (N.L.).
27/2/96	42 1 0	Waiomo ..	XV.	Hastings ..	Puru ..	William Clark.
23/3/97	100 0 0	Puru ..	" ..	" ..	Puru Main Lodes ..	Edward McWilliams.
23/3/97	100 0 0	" ..	" ..	" ..	Puru Main Lodes Ext. ..	" ..
23/3/88	47 0 0	Thames ..	IV.	Thames ..	Queen of Beauty Ext. ..	Thames Hauraki Goldfields (Ltd.).
14/12/96	100 0 0	Whangamata ..	XI.	Tairua ..	Queen Eva ..	E. C. Martin.
5/8/97	84 0 12	Tapu ..	" ..	Hastings ..	Queen's Jubilee ..	Alfred Sculthorpe Minett.
2/11/97	12 0 18	Tairua ..	III.	Tairua ..	Ranfurly ..	David Clarkson.
26/2/96	53 3 20	Waiomo ..	XIV.	Hastings ..	Rangatira ..	William Jones Smith.
23/7/96	90 0 0	Whangamata ..	III.	Ohinemuri ..	Rapid ..	Henry William Moore.
19/8/96	100 0 0	Waiomo ..	XIV.	Hastings ..	Renown ..	Renown Gold-mining Co. (N.L.).
4/6/97	84 3 5	Tairua ..	IX., XIII.	Tairua ..	Rise and Shine ..	Patrick Claffy.
19/9/96	100 0 0	The Wires ..	II.	Ohinemuri ..	Rita ..	Henry Fletcher.
23/12/96	74 0 4	Tapu ..	XV.	Hastings ..	Royal ..	Christopher Atwell Harris.
28/7/96	100 0 0	Waiomo ..	I.	Thames ..	Rupert ..	James George Wilson.
13/11/95	93 2 0	" ..	II.	" ..	Russell ..	Puru Consolidated Gold-mining Co.
6/12/95	100 0 0	" ..	" ..	" ..	Russell Extended ..	" ..
6/12/95	98 2 0	" ..	" ..	Hastings ..	Salisbury ..	" ..
19/9/96	54 0 6	Tararu ..	" ..	Thames ..	Scandinavian ..	Scandinavian Gold-mining Co.
23/12/96	31 0 0	Ohui ..	IV.	Tairua ..	Sea View ..	William Henry Cooper.
14/9/97	94 2 0	Tapu ..	XI.	Hastings ..	Shannon ..	Frederick Earl.
2/11/96	99 0 0	" ..	" ..	" ..	Sheridan ..	Sheridan Gold-mining Co.
6/4/96	58 3 20	Thames ..	V.	Thames ..	Shotover No. 2 ..	Henry Brett.
28/5/96	100 0 0	Waiomo ..	I.	" ..	Silas ..	Robert Compton Speer.
1/11/96	78 3 0	" ..	" ..	" ..	Silas Extended ..	James George Wilson.
14/12/96	92 2 6	Puriri ..	IX., XIII.	Tairua ..	Sir George ..	Charles R. Thorne.
13/8/96	0 1 10	Thames ..	IV.	Thames ..	Southern Reefs ..	William Burton.
21/11/95	12 2 34	Waiomo ..	XI.	Hastings ..	Square and Compass ..	The Crown Royal Gold-mining Co.
25/6/96	100 0 0	Whangamata ..	XIV., XV.	Tairua ..	St. Albans Ext. ..	J. C. McKinney.



**ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—continued.**

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
23/7/96	A. 100 0 0		XV.		Standard ..	Arthur W. Smith.
3/2/97	51 1 31	Ohui ..	XIV.	Whitianga	Stars and Stripes ..	John Kneebone.
13/1/97	40 2 0	Tairua ..	VI.	Tairua ..	Star of Tairua ..	Benjamin Anderson.
23/12/96	58 3 0	Tararu ..	I.	Tararu ..	Star of Tararu ..	Frederick Bennett, sen.
4/6/97	24 0 0	Thames ..		Thames ..	St. Gregory Extended	Percy Adolphus Vaile.
4/10/95	75 0 0	Thames ..	IV.	Thames ..	St. Hippo ..	The May Queen Hauraki (Ltd.).
22/9/96	100 0 0	Waiomo ..	I.		Sunlight ..	Sunlight Gold-mining Co. (N.L.).
18/5/96	90 0 11	Whangamata	XV.	Tairua ..	Sybil ..	Sybil Gold-mining Co. (N.L.).
10/5/97	100 0 0	Tararu ..		Thames ..	Straight Tip ..	Thomas Scanlon and Thomas Dunbar.
19/6/95	90 0 12	Thames ..	IV.	Thames ..	Tararu ..	Tararu Creek Gold-mining Co. (Ltd.).
8/11/97	88 2 0	Tararu ..			Tararu Big Reefs ..	Arthur Wright and James B. Blaikie.
24/7/97	70 1 20	" ..			Tararu Extended ..	Tararu Extended Gold-mining Co.
2/11/97	2 2 18	" ..	I.		Temple ..	Temple Bar Gold-mining Co.
27/2/96	65 0 5.6	Waiomo ..	I.		Temple Bar ..	
6/4/96	51 0 0	Thames ..	IV.		Thames ..	Samuel S. Mackay.
23/7/96	56 2 0	" ..			Thames Hauraki Extended ..	Queen of Beauty Gold-mining Co.
28/9/97	93 2 0	Tararu ..	IV.		Thames Reefs ..	James Joseph Macky.
18/2/98	21 3 20	Tairua ..	VI.	Tairua ..	Treasury ..	Charles McLean.
19/3/96	100 0 0	Whangamata	XV.	Ohinemuri	Three Star ..	Three Star Gold-mining Co. (N.L.).
29/5/96	100 0 0	Waiomo ..	XIV.	Hastings ..	Toulouse ..	Thomas Francis Cahill.
2/11/96	84 0 0	" ..			Toulouse Extended ..	
24/4/96	12 0 30	Whangamata	XV.	Tairua ..	Triangle ..	Frederick W. Abbott.
18/5/96	94 0 0	Waiomo ..		Hastings ..	Trojan ..	James Mays.
4/3/96	68 2 27	Tairua ..	IX., X.	Tairua ..	True Ring ..	George Symons Budge.
3/2/97	100 0 0	Whangamata	XIV., XV.		Trump ..	William Benjamin Jackson.
26/2/96	48 2 20	Waiomo ..	XV.	Hastings ..	Ulysses No. 3 Ext.	Percy Spencer.
10/5/97	49 1 5	" ..	XIV.		Unicorn ..	Frederick Ernest Shera.
25/6/96	56 2 36	Whangamata	XV.	Tairua ..	Union ..	Wairoa Gold-mining Co. (N.L.).
13/11/95	74 2 0	Waiomo ..	II.	Hastings ..	Uranus ..	Puru Consolidated Gold-mining Co. (Ltd.).
8/3/96	100 0 0	" ..		Thames ..	Uranus Extended ..	
5/2/95	7 0 0	Tairua ..	IX.	Tairua ..	Venus ..	James Mackay, jun.
24/7/97	100 0 0	Puriri ..	XIII.	Thames ..	Vernon ..	Richard Leary.
19/9/95	41 3 10	Thames ..	IV.		Victoria ..	The Victoria Gold-mining Co.
29/1/98	33 3 1	Tairua ..	VI.	Tairua ..	" ..	Herbert Gordon.
23/3/96	96 3 0	The Wires ..		Ohinemuri	Volunteer ..	J. P. P. Seaver.
27/2/96	100 0 0	Tararu ..	II.	Thames ..	Vulcan Extended ..	Henry Lomas Smith.
14/9/97	34 0 30	" ..			Vulcan Cheers ..	John Thomas Julian.
6/2/96	100 0 0	Waiomo ..	XV.	Hastings	Waimea ..	Thomas Morrin.
		" ..	II.	Thames		
20/3/96	17 1 0	" ..	XV.	Hastings	Waimea Extended ..	John Hague Smith.
		" ..	II.	Thames		
2/11/96	100 0 0	" ..	XIV.	Hastings ..	Waingohia ..	John Murphy and J. B. Fairs.
10/5/97	100 0 0	" ..	XIV., XII.		Waiomo Extended ..	William Read Bloomfield.
5/9/95	22 3 30	Thames ..	IV.	Thames ..	Waiotahi ..	The Waiotahi Gold-mining Co. (Ltd.).
27/8/96	27 2 29	Waiomo ..	XIV.	Hastings ..	Waipuru Extended	James Kernick.
19/8/96	100 0 0	Whangamata	XV.	Tairua ..	Wairoa ..	Wairoa Gold-mining Co. (N.L.).
21/11/95	30 0 0	Thames ..	IV.	Thames ..	Waitangi ..	Arthur Pittar.
15/3/97	96 0 0	Puriri ..	XIII.		Wandoline ..	Edmond T. Dufaur and James Russell.
5/8/97	100 0 0	Tararu ..	IV., V.		Waratah ..	Chas. Kingswell and John Thomas Baker.
2/11/96	100 0 0	Whangamata	III.	Ohinemuri	Waterwitch ..	George Dunnett.
19/9/96	100 0 0	Waiomo ..	II.	Thames ..	Wenona ..	Wenona Gold-mining Co. (N.L.).
6/12/88	6 1 0	Thames ..	IV.		West Coast ..	John Northey.
8/6/97	7 3 15	" ..	VII., XI.	Hastings ..	Weymouth Extended	Hugh Thomas Torrens.
19/9/96	92 2 28	Whangamata	XII.	Tairua ..	Whangamata Peninsula	Claude Lorraine Kerry.
6/4/96	94 0 17	" ..	XV.		Wharekawa ..	Frederick W. Abbott.
29/10/96	9 0 15	Puriri ..	XIII.		Why Not ..	Robert Worth.
29/5/96	100 0 0	Tairua ..	II.		Winder ..	Andrew M. McMahon.
23/12/96	50 1 28	" ..			Winder Extended ..	Albert Gold-mining Co. (N.L.).
8/6/96	100 0 0	Waiomo ..	XIV.	Hastings ..	Windsor Castle ..	T. Millitt and E. J. G. F. Greville.
27/8/96	16 2 30	" ..			Windsor Castle No. 3	Ernest C. Beale.
19/8/96	60 3 1	The Wires ..	III.	Ohinemuri	Wires ..	M. J. Gannon and J. Barber.

*Mata District.*

In this district, with the exception of desultory prospecting, very little work has been done in the claims taken up during the past two years.

*Tapu District.*

*Sheridan Mine* (Area, 100 acres; owners, Sheridan Gold-mining Company).—The chief work carried on during the year was in extending the low-level adit and driving a cross-cut to the reef. A drive was put in to the northward 75 ft. on the reef, which averages 2 ft. 6 in. in width, and it is intended to drive to the southward a distance of 120 ft. at this point. A rise will be put up to connect with a winze sunk on the reef from No. 3 level for 50 ft. This work will open up the mine, giving backs of 152 ft. between the No. 3 and the low level. Prospecting is also carried on at No. 2 level. A parcel of 443 tons of quartz taken from various parts of the mine was crushed, for a moderate yield of 40 oz. 1 dwt., valued at £118 5s. 3d.

*Jessie*.—This claim, which is situated on the northern side of Tapu Creek, was worked for a short time, and 15 cwt. of quartz was crushed, for 4 oz. 2 dwt. of gold.

*Golden Point Mins* (Area, 120 acres; owner, Golden Point Gold-mining Company).—Operations on the leaders cut in the shaft-workings were carried on for a time, but only a small parcel of  $2\frac{1}{2}$  tons of quartz was crushed, for 1 oz. 6 dwt. of gold.

*Mahara Royal (Limited), Tapu*.—In June, 1896, an option was taken over the Mahara and the Royal Special Claims by the Austinfriars Finance Syndicate, of London, and shortly afterwards it was floated into an English company with a subscribed capital of £30,000. This property is managed by the Thames Exploration Syndicate. When the property was taken over, the Royal reef had been cut in the surface level with only a few feet of backs. It was decided, for the future development of the property, to open up a lower level at a perpendicular depth of 80 ft., which, with the underlie, gave about 140 ft. of backs. When the reef was cut at this lower level, driving north and south on the course of the reef was proceeded with, and very fair prospects obtained. Reports were forwarded to London recommending a certain course of action for further developing and opening up the property. When some 300 ft. had been driven on the main reef the construction of a water-race was commenced, capable of driving a thirty-head battery even in the summer. A ten-head stamper battery was also erected, to test the reef for a period of twelve months prior to putting up a larger plant. The water-race and erection of battery were completed about October, 1897, since which time crushing has been continuously carried on. The reef averages about 6 ft., varying from 2 ft. to 10 ft. About 2,200 tons of ore have been treated, for a yield of about 1,000 oz. of bullion, at £3 1s. 6d. per oz. This has not only paid the working-expenses, but has also paid for further development of the property.

A drive has been made in the Fluke section of the property with 250 ft. of backs. The reef has been cut, but the value of it has not yet been ascertained. Another new adit has been commenced to cut the Royal reef at a lower level, which will give another 150 ft. of backs on the same reef under the present workings. Some 600 ft. of driving will be required to cut the reef. About 800 tons of tailings have been saved for treatment by cyanide. Various tests made show the value to be about £1 per ton. It is the company's intention to increase the size of the plant, and also to erect cyanide plant, in October or November next. Five tons of ore are now being shipped to London for experimental purposes.

#### *Waiomo District.*

*Monowai Mine* (Area, 89 acres; owners, Monowai Gold-mines, Limited).—A large amount of work has been done in opening up the levels on the reef: At the No. 3b level 500 ft. have been driven on a large reef 30 ft. in width; on No. 3a level 300 ft. of driving has been done on the reef; on No. 2 level a winze is being sunk on the reef to connect with No. 3b level; and winzes are also in progress to connect and ventilate the different levels. Large blocks of reef will be available for stoping as soon as the mill is in order and water for power can be had. A ground tramway 100 chains in length is being constructed for the purpose of conveying the quartz to the battery. Two incline sections are on this line, one 6 chains and the other 14 chains in length. The Gem reef, which has been well opened in the section to the westward of the Monowai, is connected with the mill by a ground tramway 60 chains in length. On this line there is an incline of 18 chains, the trucks being lowered and raised by the use of a brake-wheel and wire-rope. The mill, which consists of one rock-breaker of ten stamps, one berdan, two Brown and Stanford's concentrators, five cyanide-vats, and two zinc filters, is driven by a Pelton wheel for the stamps and a portable steam-engine for the concentrators. The treatment to be adopted is wet-crushing and amalgamation, then concentration, the concentrates to be shipped to England for treatment, and the tailings treated by the cyanide process. The ore in the Monowai reef is highly charged with copper, and has not hitherto been successfully dealt with for the extraction of gold and silver in other than an experimental manner, but the methods now to be adopted give promise of successful application. Forty-five men are employed.

Prospecting operations were for a short time carried on in the Comstock, Broken Hill, and other mines in this district.

#### *Puru District.*

*Puru Consolidated Mine* (Area, 392 acres; owners, Puru Consolidated Gold-mining Company).—The chief work done during the year was the erection of a battery of ten stamps and two amalgamating-pans. This will be driven by water-power. A race has been cut 40 chains in length, and a fall of 28 ft. is had at the battery. An aerial tramway, 33 chains in length, conveys the quartz to the battery. The mine is well opened up, the reef being about 3 ft. in thickness, and, as gold is visible in the quartz, there is a hopeful outlook for success when sufficient water is available to drive the machinery.

Prospecting has been carried on in some other claims, but not to any great extent. In the Alma Claim, situated between the Puru and Tararu Creeks, prospecting work has been carried on for a few months.

#### *Tararu District.*

*Tararu Mine* (Area, 160 acres; owners, Tararu Creek Gold-mining Company).—Operations have been carried on in extending the low level, which has now reached a distance of 2,350 ft. from the entrance, and at the end is 638 ft. below the surface. Driving and stoping was also carried on on Nos. 3 and 4 levels, and 1,970 tons of quartz was brought to the mill and crushed, for 426 oz. of gold saved by amalgamation, value £1,288 12s. 8d., and 1,995 oz. by the cyanide process, value £1,057 7s. 11d. Forty-seven men were employed. On the 25th March the mill was entirely destroyed by fire, and a new plant, consisting of thirty head of modern stampers, with stone-breaker and ore-feeder and six cyanide vats, is to be erected. In place of the old overshot water-wheel a Pelton will be used.

*Kaiser Mine* (Area, 49 acres; owners, Kaiser Gold-mining Company).—The drive on the new reef was continued to a distance of 104 ft., the quartz being from 1 ft. to 3 ft. in width. A low

level was also driven 146 ft., and the reef cut, on which driving was continued for 124 ft. A winze was also sunk from No. 1 to the low level. The quartz, which is of a highly mineralised character generally, was crushed, and treated by the ordinary process. 112 tons yielded 88 oz. 10 dwt. of gold; value, £286 7s. Six men were employed.

*City of Auckland Mine* (Area, 100 acres; owners, City of Auckland Company).—The shaft commenced the previous year was sunk to a depth of 170 ft., and 600 ft. of driving was done. The development of the reef, which is here about 15 ft. in width, did not disclose quartz of a valuable character. One ton of picked quartz yielded 2 oz. of gold; value, £3 10s. 8d. Seven men were employed.

*Scandinavian Mine* (Area, 54 acres; Arthur Molyneux, owner).—This mine was idle for six months, and only a very limited amount of work has been carried on during the latter half of the year. Twelve tons of quartz yielded 16 oz. 5 dwt. of gold; value, £41 17s. Two men were employed. The mine-manager, Mr. Alexander Whitley, furnished the following account of the mine and ownership during the past year: "The mine and plant were taken over in March, 1897, by Mr. Arthur Molyneux, on behalf of an English syndicate, who undertook to float a company to provide capital to open up and thoroughly develop the mine. They still hold this option over the property. The mine was protected from March to September, 1897, and since that time has been working by permit with two men. The work done since September has been mostly surface prospecting, trenching, and shallow drives on some of the undeveloped reefs. Fair prospects were obtained in the different reefs, all of which are worthy of further development. A little stoping was done on a small reef at the lowest level, 100 ft. from the surface. Twelve tons of ore was broken out and treated at the company's mill, for the return of 16 oz. 5 dwt. bullion, valued at £41 17s., which left a small profit after paying expenses of breaking and treating. This latter work is being continued at the present time, with encouraging results."

*Sunlight Mine* (Owners, Sunlight Gold-mining Company).—Driving has been carried on in the No. 2 leader, which varies from 2 in. to 2 ft. in thickness. Four men are employed.

*Argosy Mine*.—This mine is situated on the range to the northward of Tararu Creek. Several large gold-bearing reefs are known to exist in the ground, and occasional small patches of rich stone have been obtained; 4 cwt. of quartz yielded 23 oz. 6 dwt. of gold; value, £77.

*Chicago Mine*.—Prospecting work was carried on in this mine, and from a parcel of 3 tons of quartz a yield of 7 oz. 2 dwt. of gold, value £18 19s., was obtained during the latter end of 1897, when two men were employed. Since that time a larger staff of twelve men was employed in developing the different reefs in the ground, and in preparing for the erection of a battery of ten stamps; also in constructing a water-race and a tramway. The water-race will be 49 chains in length, and give a fall of 260 ft., which, it is expected, will supply ample power to drive the battery.

*Vulcan Extended*.—This property has an area of 100 acres, and is situated in the Upper Tararu district. The Thames Exploration Syndicate has a working option over it at the present time. A cross-cut was commenced about 40 ft. from the surface to cut what is known as the old Vulcan reef, which has a north-east and south-west course. This drive is known as the intermediate level. Some very fair gold and picked stone were obtained at this point, and the reef averaged about 7 ft. in thickness. The prospects being so encouraging, it was decided to put in another drive to cut the reef at a lower level. This was started from the creek-level, which gave 100 ft. more backs. The reef was cut after driving 120 ft., and driving was then continued with the object of cutting other reefs which are known to exist in this property. The whole length now driven is 360 ft. A battery-site and water-race rights have been obtained, and it is the intention of the syndicate to proceed with their erection and construction during the present year. A parcel of 5 tons of ore is being shipped to London for experimental purposes. The mine is opening up well as development work proceeds, and there appears every probability that it will turn out a paying concern. Very good prospects were met with during the whole length of the driving of the 360 ft., and several trial lots were taken out and treated by the ordinary wet process with very satisfactory results. The last 1½ tons treated at May Queen Extended battery yielded at the rate of £2 12s. 2d. per ton.

*Temple Bar Mine* (Owners, Temple Bar Gold-mining Company).—Driving in the low level has been carried on during the year, the reef averaging about 1 ft. in thickness. Two men are employed.

Lylas, Mount Taylor, Eaglehawk, and Ake Ake Mines have been worked during the year, but are at present under protection.

#### *Shellback District.*

*Waitangi Mine* (Owners, Waitangi Gold-mining Company).—Since the expiration of protection in the early part of the year developing operations have been carried out in Nos. 3 and 4 reefs, top level, which is some 4 ft. in width. A parcel of quartz has been sent to the battery for crushing, but as yet no returns are to hand.

*Thames Special* (Area, 51 acres; owner, Samuel C. Macky).—In this claim very little work was done during the year. Nineteen tons of quartz was crushed, for 18 oz. 14 dwt. of gold.

Prospecting was also carried on in the Magazine and other claims.

#### *Kuranui District.*

*Kuranui Mine* (Area, 15 acres; owners, the Kuranui Gold-mining Company, Limited).—The shaft is 150 ft. in depth, and from the level at this depth a winze was sunk 46 ft. The reef is 2 ft. 6 in. in width. A drive has been put in on this reef for 60 ft. The Oddfellows reef has also been driven on for 75 ft. No crushing has been done at the battery during the year; therefore no returns of gold. A party of tributers crushed thirty-seven loads from the surface, for 5 oz. 15 dwt. of gold; value, £14 13s. 3d. Three wages-men and two tributers were employed.

*Kuranui Caledonian Mine* (Area, 29 acres 3 roods 20 perches; owners, Kuranui Caledonian Gold-mine, Limited).—The chief works carried on during the year were driving on No. 1 reef and

cross-cutting at No. 4 level; stoping, driving, and sinking on the cross-reef and Darby's and Kelly's leaders at Nos. 1, 2, and 3 levels. In prosecuting those works winzes were sunk 196 ft., driving cross-cuts 752 ft., driving on reefs 1,726 ft., and repairing old levels 1,950 ft. The quantity of quartz crushed was 223 tons, which yielded, by amalgamation, 1,174 oz. 9 dwt. of gold, valued at £3,139 5s. 7d. Thirty-seven men were employed.

*Moanataiari District.*

*Moanataiari Mine.*—This company has, during the past twelve months, done a very large amount of development work in the mine, and still has a considerable amount to do before the mine can be said to be fully opened up. The mine is divided into two distinct sections—namely, the eastern and western sections. Eastern section: The eastern section is the portion of the property on the east side of the main Moanataiari slide. The work in this portion of the mine has been extending the Point Russell level to the boundary of the property on the Golden Age reef, and also extending the intermediate and 100 ft. levels on the Golden Age and Reuben Parr reefs. The main-adit level, known as the Moanataiari Tunnel, has been extended for a distance of 600 ft., making a total length that this adit level goes back into the range of 3,700 ft. In extending the main-adit level a deviation from the straight line was made at 3,200 ft. in from the mouth, in order to get clear of a hard bar of rock, and also to intercept and follow the course of the Golden Age lode on that level. An uprise has been constructed from the end of the main adit for a height of 120 ft., and a drive is now in course of construction to cut the Reuben Parr lode underneath the place where a chute of good ore was found on the 100 ft. level. At the main-tunnel level the Golden Age reef is broken up to a large extent, and is not nearly so well defined as it is on the upper levels. On the Point Russell level it has an average of fully 6 ft. in width, and in some places it widens out to a width of 12 ft., whereas in the main-adit level it is only from 18 in. to 3 ft. in width. Nests of specimen stone are occasionally found above the Point Russell level, although the general body of the ore is comparatively of low grade. It is expected that the Reuben Parr and Golden Age reefs will junction between the 100 ft. level and the main-adit level, but the junction of these reefs has not yet been met with. Western section: The western section of the mine is that portion which lies on the seaward side of the Moanataiari slide. Previous to the present company taking over the mine all the known payable ore was taken out of this section to a depth of about 150 ft. below the main adit level, which was worked from a shaft constructed in a chamber a little to the northward of the main-adit level, and at a distance of about 1,400 ft. in from its mouth. This shaft has now been abandoned, and the whole of the workings in this section are carried on from a new shaft, which has been sunk on the south side of the Moanataiari Creek to a depth of about 500 ft., or about 400 ft. below the level of the main adit. Four different levels have been opened out from this shaft, and stoping is now being done on the No. 1 and No. 2 Caledonian reefs, on No. 2 and No. 3 levels, and also on the No. 9 Moanataiari reef on No. 1 level. A level was opened out at the bottom of the shaft, and the No. 1 and No. 2 Caledonian reefs were cut and driven on for some distance; but the general body of the ore in the reefs at this level, so far as the working has advanced, is of comparatively low grade. The No. 1 reef has a thickness of about 24 ft., and carries a great deal of mineral, and from its appearance one would think that it should contain good ore. The impression is, however, that a good chute of ore is not far distant. All working on this level is suspended for the present, until the development on the Cambria reef is further advanced. A cross-cut of nearly 1,000 ft. in length has been constructed from the shaft on the No. 3 level to the Cambria reef, which is now being driven on, and several veins and stringers of highly auriferous quartz are met with, coming in from the country-rock into the hanging-wall side of the lode. The reef itself is enclosed in a splendid class of country-rock, where one would expect to find a body of good ore in the reefs, but, so far as yet opened out, the best portion of the reef is on the hanging-wall side. In driving eastward from the cross-cut towards the main slide a slight break has recently been met with, and it is expected that as soon as this break has been gone through, good ore will be found in the general body of the lode. A cross-lode was met with in constructing the cross-cut from the shaft, but the juncture of the cross-lode and the main Cambria reef has not yet been reached, and it is now apparent that this cross-lode has something to do with the break that has been met with. A large amount of development work had to be done in this portion of the mine to get connections for ventilation with the old drives in the Kuranui Caledonian Mine, and an uprise will have yet to be constructed to the old workings in the Cambria Mine, which now belongs to the Moanataiari Company, before good ventilation is secured. Crushing battery: A new crushing battery has been erected, consisting of sixty stamps of 1,100 lb. each, two Blake-Marsden 16 in. by 10 in. rock-breakers, twelve Challenge automatic ore-feeders, twenty-four vanners—twelve of each are of the Union pattern and twelve of the Frue—twenty-one berdans, and a cyanide plant, consisting of three iron percolating-vats each 20 ft. in diameter and 3 ft. in depth, along with solution- and mixing-vats, and also two concrete sumps; and a vacuum boiler and pump. Owing to the main adit being at so low a level—only some 20 ft. above the level of the flat—and the street passing close in alongside the range, the grizzly and rock-breakers had to be constructed at a lower level than the bins or hoppers for holding ore to feed the stamps. The ore, as it comes out of the mine, is dumped on to the grizzly, and the fine material passes through the bars into a hopper, while the large pieces of ore are landed on a flat sheet, and fed into the rock-breakers, and after passing through these fall into the same hopper where the fine material lands after passing through the bars of the grizzly. The broken ore from this hopper is taken up by trucks on two cages worked by two hydraulic lifts to such a height as enables the trucks to be run along on the top of the storage-hoppers, from which the ore passes into the automatic ore-feeders, and is fed into the mortar-boxes. The stamping battery is constructed in two sections, each section consisting of thirty heads, having about 30 ft. between them. Each thirty heads is driven by a separate Pelton water-wheel, while another Pelton wheel drives the stone-breakers. The battery is so arranged that a steam-engine is erected on a concrete and brick foundation between the two

sections of the stamps. This engine was considered necessary in order to insure the mill being continuously worked in dry weather when water was not available for motive-power. There are tables fitted to each battery of five stamps, each table being 6 ft. in width and 10 ft. in length, covered with Muntz-metal plates, and silvered. From each of these tables the crushed pulp is led in a chute on to two vanners, which concentrate the ore, the concentrates being collected in a box at or near the head of each vanner, while the tailings pass into a main chute, and are carried away with water into nine sets of Cornish buddles. Each set of twelve vanners is driven by a Pelton wheel; the berdans are also driven in two divisions, with a Pelton wheel for each division. A tram-line is laid down all the length of the battery building, and the concentrates from the vanners are filled into trucks, which are run along this line and lifted in a cage worked by a hydraulic lift to the level of the top of the percolating-vats, where there are two lines of rails, and the concentrates are dumped into the vats, to be treated with cyanide solution. A Pelton wheel is also used to work the vacuum pump, and for pumping the solution from the sumps into the mixing-tank, where it is again made up to the proper strength required to use again. The steam-engine is of the compressed condensing tandem type, manufactured by Davey, Paxman, and Co., the high-pressure cylinder being 17½ in. in diameter and the low-pressure cylinder 34 in. in diameter, provided with automatic expansion-gear, special governor, and jet-condenser, with air-pump fitted with indiarubber valves. The engine travels at a piston speed of 400 ft. per minute, and is capable of developing 240-horse power. Steam is supplied by two of Babcock and Wilcox's boilers, which are tested up to a pressure of 300 lb. per square inch each. It is found that this class of boiler is far more economical in the consumption of fuel than either the Lancashire or multitubular boilers, while the cost in the first instance is less. Care, however, has to be taken that water charged with mineral substances is not used. Attached to the battery building is a retort and assay-room, and every convenience for the working of the mill, while the whole building is lighted with electric light, produced by a 200 incandescent lamp dynamo, each lamp being 16-candle power. The dynamo is erected in the engine-room with switchboard, so that any light can be turned out when not required, and it is driven by a separate Pelton wheel. The foundations of the battery are very massive and strong. The mortar-logs were each 18 ft. in length, 5 ft. 3 in. by 2 ft. 6 in., all in one piece. These are set on a cross-log resting on a solid concrete foundation. It was difficult to get down to solid rock in one of the sections of the battery, and the contractor got the option of either sinking down to the solid rock or driving two rows of piles, and placing a thick bed of concrete on the top of these before laying down the bed-log for the mortar-blocks to rest on. The latter system was adopted, and the foundations are of so stable a character that there is very little vibration to be felt when the stamps are running at their full speed—namely, 95 drops per minute. The whole of the mill is of the most approved American design, and it may be said to be the most complete wet-crushing mill in the district. It was erected under contract by Messrs. Price Brothers, of the Thames, on designs approved by H. A. Gordon, the general manager of the company, and the electrical insulation was done by Messrs. Chambers and Sons, of Auckland. The mill commenced crushing, with thirty heads of stamps, in February last, and up to the end of April 2,220 tons of ore was crushed out of the mine, which yielded on the plates only gold to the value of £2,500 9s. 9d. The other thirty heads of stamps were only completed in April. The contractor could not complete his contract until the County Council laid down a new water-main to supply water for motive-power and for the tables of this section of the mill. In addition to the gold obtained from the plates, there is 190 tons of concentrates on hand, having an assay-value of £694. The concentrates have not yet been treated. It has been found that the gold the concentrates contain cannot be extracted until subjected to a roasting operation. The large quantity of sulphurous acid generated by a rapid decomposition of the concentrates and the particles of pyrites enclosing the gold is not acted on to any extent when in a raw state. This acid, although neutralised considerably by the use of caustic soda, prevents the cyanide acting on the gold. Mr. Park, who has charge of this part of the process, had to take 100 tons of concentrates out of the vat, after it had been subjected to cyanide solutions for one month, without extracting but very little of the bullion. The whole of the concentrates are now being stacked, awaiting the erection of a reverberatory furnace.

*New Alburnia Mine* (Area, 63 acres 3 roods 20 perches; owners, New Alburnia Gold-mining Company, Limited).—The chief work carried on during the year was further sinking of the shaft, which is now 550 ft. in depth; opening chambers, and cross-cutting to the reef, which varies from 2 ft. to 12 ft. in width; driving on the reefs, and stoping out quartz. 3,744 tons of quartz was crushed, for a yield of 1,771 oz. of gold, valued at £1,717 12s. 9d. Forty-five men were employed.

*Darwin Mine*.—Two men were employed working on a reef 10 in. in thickness. Seven tons and a half of quartz yielded 4 oz. 2 dwt.; value, £11 10s.

*Fearnaught Claim*.—A party of two men are driving the surface prospecting levels, but as yet no good results have been met with. Two tons of quartz was crushed, for a yield of 1 oz. 14 dwt. of gold.

*Tudor Mine*.—A winze has been sunk on the Bendigo Reef. The reef is some 18 in. in thickness, and 14 tons of stone yielded 32 oz. 3 dwt. of gold.

Operations were also carried on in the New Whau, Orlando, Moanataiari North, and Alburnia East Claims.

#### Grahamstown.

*Victoria Mine* (Area, 41 acres 3 roods 10 perches; owned by the Victoria Gold-mining Company).—The work carried on during the year was on the Victoria leader, between No. 1 and No. 2 levels. The quantity of quartz mined and treated was 604 tons, for a yield of 653 oz. of gold, valued at £1,764 9s. Nineteen men were employed.

*Cardigan Mine* (Area, 64 acres 2 roods).—The work engaged in at this mine has been altogether of a prospecting nature, and the five men employed are now driving on the Cardigan reef. No returns are recorded.

*Drainage.*

The deep levels at the Thames continue to be drained by the machinery and pump in the Big Pump shaft, the whole being under the control of the Thames Drainage Board, the members of which are elected by the contributing companies and the Thames Borough and County Councils. The business is conducted in Auckland, at which place the meetings of the Board are held. The following extract from the annual statement of accounts shows the financial position of the Board, and also the contributions from the different companies assessed :—

Company.	Arrears.	Assessment.	Rebate.	Cash received.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
May Queen Gold-mining Company ...	...	1,000 0 0	125 0 0	875 0 0
Waiotahi " ...	...	645 0 0	80 12 0	564 8 0
Victoria " ...	...	600 0 0	75 0 0	525 0 0
Kuranui-Caledonian " ...	...	427 0 0	53 8 0	373 12 0
Moanataiari " ...	...	354 0 0	44 5 0	309 15 0
Cardigan " ...	...	300 0 0	37 10 0	262 10 0
Cambria " ...	...	250 0 0	31 5 0	218 15 0
Thames-Hauraki " ...	...	240 0 0	30 0 0	210 0 0
Kuranui " ...	...	90 0 0	11 5 0	78 15 0
Thames Borough Council ...	10 0 0	120 0 0	..	100 0 0
Thames County Council ...	20 0 0	150 0 0	...	157 10 0
	30 0 0	£4,176 0 0	£488 5 0	£3,675 5 0

The Big Pump has worked very satisfactorily for the last four months. The quantity of coal used has been, on an average, 197 tons per month, which has been chiefly Hikurangi coal, and has been delivered in the yard at 12s. 8d. per ton; and the total cost of working the plant has been £257 per month. It was found necessary to employ two watchmen to look after the water that was put down the Tookey shaft for the purpose of ventilating the Pump shaft, so as to prevent any accident through the stoppage of the water, thereby causing the current of air to cease, and allowing the gas to accumulate in the Big Pump shaft, and getting distributed into the surrounding mines and endangering the lives of men working in them. The appointment of the men has been found to work admirably, as there has not been the slightest appearance of any gas to do any harm since they were appointed. The manager, Mr. J. Brokenshire, reports as follows: "I have the honour to inform you that the pumping operations have been carried on continuously during the past twelve months, with the following exceptions: After the annual clean-out of the water-race, pumping was resumed at the beginning of January. On the 19th January the strapping-plates on the main rods between the 300 ft. and 400 ft. levels gave way, and were replaced with stronger ones. On the 20th March the glands of the main rod at the 100 ft. level were found to be broken, and two new ones were at once obtained and placed in position. In April and May last advantage was taken of the Kuranui Caledonian Company carrying on operations through the Big Pump shaft to clean out and repair the main drive at the 400 ft. level, in order to keep the ventilation open. The balance-bobs at the surface and the 300 ft. level were getting out of repair, and had to be overhauled, repairs being completed in June last. On the 30th June the main strapping-plates connecting the surface balance-bobs with the main rod suddenly parted, and pumping had to be discontinued until the necessary repairs were effected. On the 8th July we stopped pumping to make ready for the annual boiler inspection, which took place on the 13th, pumping being resumed on the 15th. The Inspector remarked that the main boilers looked remarkably well for their age, but recommended great care be exercised in their use. He condemned the cylinder of the winding-engine, and a new one was supplied by Mr. Judd. On going down the shaft in August last to repair the guides, to enable me to get to the 500 ft. level and make preparations for fixing the new working-barrel in position, we found that several sets of timber in the main shaft had given way. These were replaced as expeditiously as possible. Another two days' stoppage occurred on the 20th and 22nd August, through an accident to the water-race. On the 18th November pumping was discontinued, in order to place the new working-barrel, clack, and seating in position. The old ones were found to be in a very bad state, and the wind-bore almost choked with broken metal. The county water was shut off on the 26th December for the annual clean-out of the water-race. Pumping was resumed this morning, advantage being taken of the stoppage to overhaul the machinery, which is now in very fair condition, considering the length of time it has been in use. The buildings are in very fair condition, with the exception of the flooring in the winding-engine house, which is very rotten, and will shortly require renewing. The working-expenses last month were £231; extra expenses for repairs, £5. The consumption of coal for the past year was 2,358 tons.

*Waiotahi Creek District.*

*Waiotahi Mine* (Area, 22 acres 3 roods 30 perches).—This mine still continues to be worked on the same lines as for the past twenty years. The veins worked on are from  $\frac{1}{4}$  in. to 6 ft. in width, and the mine is kept so well opened up that payable crushing is continuous. 1,360 tons crushed yielded 1,931 oz. 9 dwt. of gold, valued at £5,227 17s. 3d. Sixteen men are employed.

*Nomporeil Mine* (Area, 21 acres).—Work has been carried on in this mine. The two reefs



worked are the Liverpool reef, 1 ft. wide, and the Wade reef, 9 in. The quantity of quartz sent to battery was 294 tons, which yielded 361 oz. 10 dwt. of gold, valued at £1,008 9s. 9d.

*West Coast Mine.*—This claim is still worked by the owner, Mr. John Northey. Forty-nine tons of quartz yielded 47 oz. 7 dwt; value, £122 3s. 6d.

*Little Maggie Mine.*—This claim adjoins the Nonpareil. William Bright, the owner, has been engaged in driving and stoping on small leaders and stringers. Fifteen tons of stone has yielded a return of 16 oz. 2 dwt. of gold.

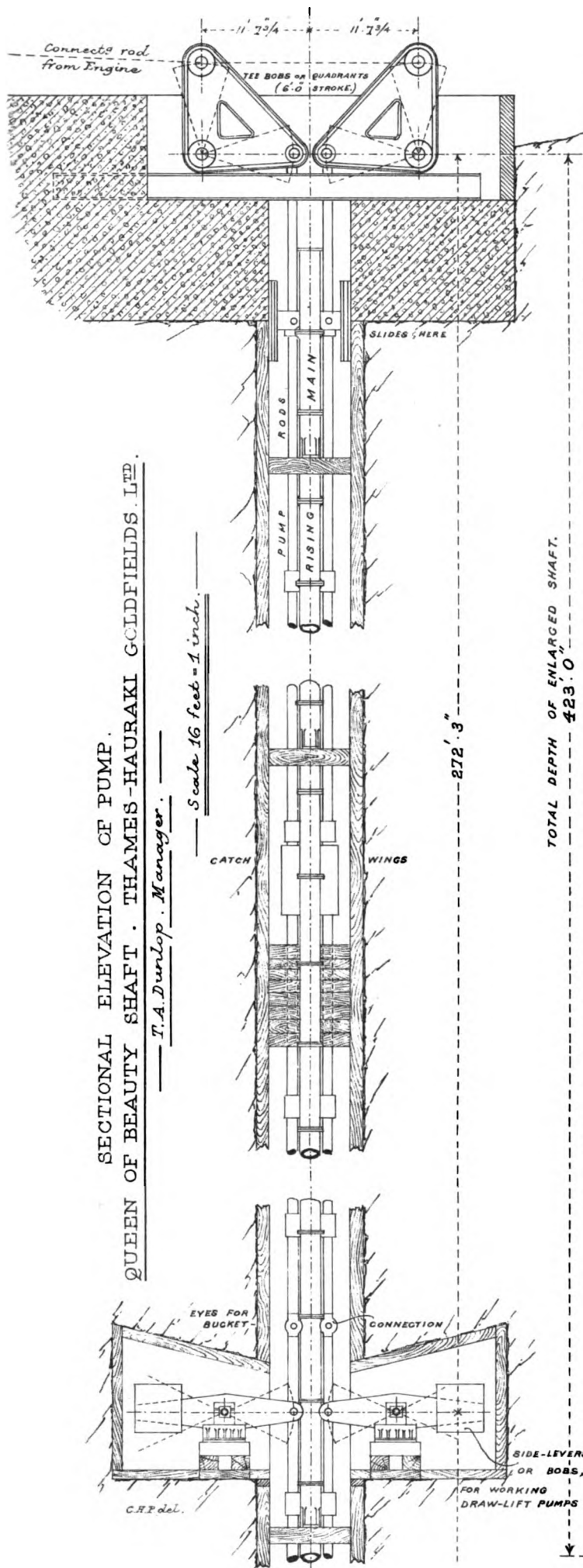
*Infant Claim.*—This is worked by the owner, J. Johnson. Eight tons of stone from small leaders and stringers gave a return of 8 oz. 17 dwt. of gold.

*Hauraki Golden Age Special Claim* (Area, 71 acres 3 roods 29 perches; owners, Hauraki Golden Age Mines, Limited).—The main reef, the Golden Age, is very mullocky, and varies from 4 ft. to 30 ft. in width. The work carried on in 1897 comprised cleaning up the adits and relaying roads, cleaning out old levels and winzes and driving prospecting levels, sinking winzes, and generally prospecting and developing the property. No mine machinery is employed at present, but £1,712 has been spent on an aerial tramway. The mill machinery comprises one 220 brake horse-power steam-engine for driving new forty-stamp mill, &c. Pelton wheel—one driving old twenty-one-stamp mill and thirteen berdans; rock-breakers—two Blake-Marsdens, for new mill; sixty-one stamps for wet-crushing (forty new and twenty-one old); thirteen berdans; two concentrators (not erected). Capital expended on mill machinery, &c., in 1897, £7,962. Average number of men employed, thirty.

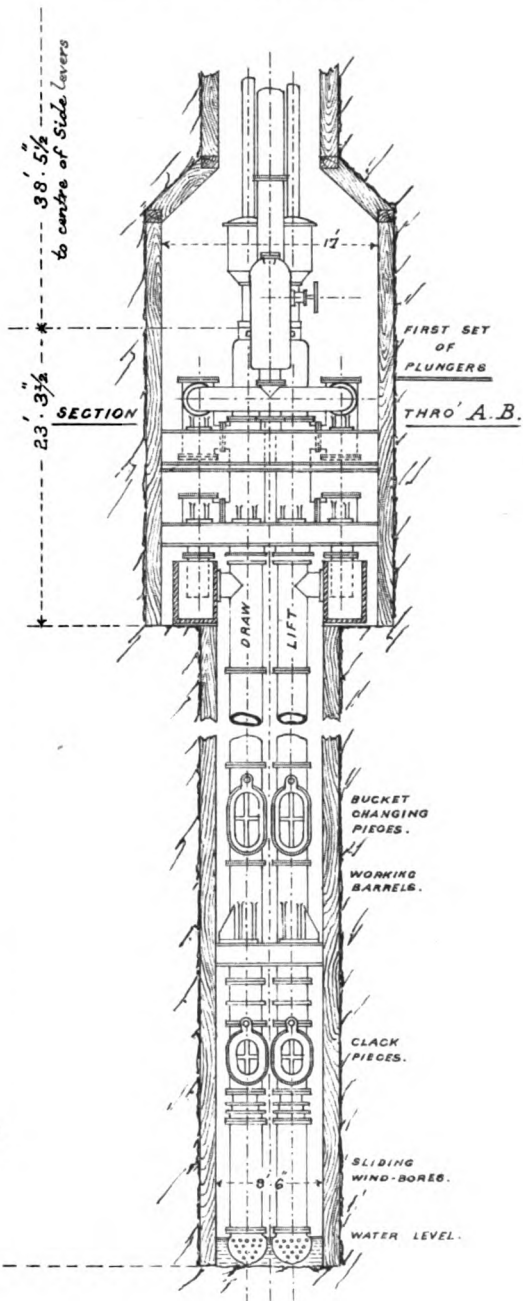
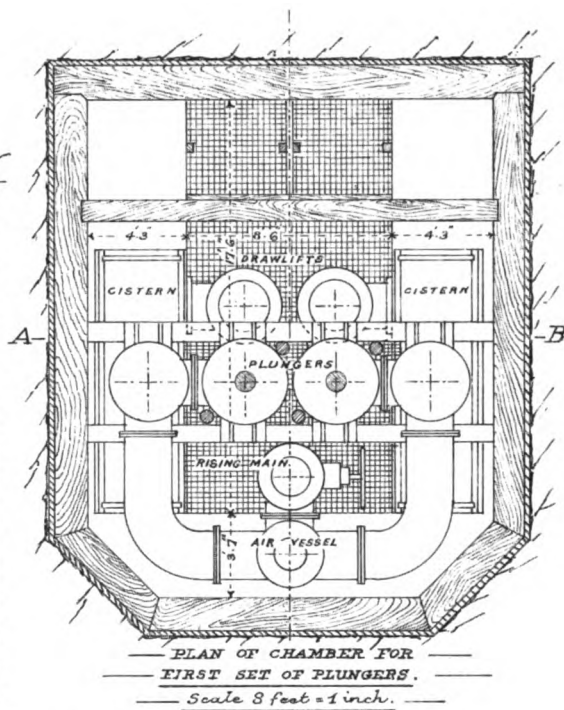
#### *Waiokaraka District.*

*Thames-Hauraki Company.*—The erection of this company's pumping plant has proceeded very slowly during the past year, owing to the machinery coming out piecemeal from the contractors, the Sandycroft Company in England, and, strange to say, the parts that were shipped first were those that were not required until the whole of the other portions were put together; indeed, it was a long time before the bed-plate for the pumping-engine came to hand. The same thing took place with the pump-pipes; they were the first shipment that arrived, but no girders or bed-plates arrived for twelve months after the arrival of the first shipment of pipes. A cablegram has been received from London that the whole of the machinery was shipped on the 15th April last, so that it is expected here in the beginning of June. The position at the present time is as follows: Ten steel Lancashire boilers, 30 ft. long and 7 ft. in diameter, have been put together and riveted up by Messrs. Price Brothers, of the Thames. These have been erected in position, and fitted with Howl's patent furnaces for burning slack coal. Each of the boilers was tested up to a pressure of 300 lb. per square inch, by hydraulic pressure, before leaving Messrs. Price Brothers' establishment. The Howl's furnaces, which are fitted into the internal flues of these boilers, will effect a great saving in the consumption of fuel. Everything has to be burnt to ashes sufficiently small to come through a hole or slot about  $\frac{1}{4}$  in. wide. Although none of these furnaces have been actually tested in this plant, similar furnaces are fixed to some of the boilers in Auckland, which burn any rubbish in the shape of fuel, and give the greatest satisfaction. The principle of these patent furnaces is that the fuel is charged on to plates having narrow slots instead of fire-bars, and there is a jet of steam brought from the boiler and introduced underneath the plates. The steam, passing through the hot fire, is relieved of its oxygen, and the hydrogen is set free, and burns. This jet not only carries a draught, but also increases the heat of the flame from the fuel. The boilers are all built in side by side, having flues on sides and underneath. These lead into a large flue 3 ft. in width and 7 ft. in height, which goes along the back end of the rows of boilers, and leads to the chimney-stack. The flame, after passing through the internal tubes, passes into the flue underneath the boilers, and returns to the flues at each side. The back end of each side-flue is fitted with a damper to regulate the draught in each boiler. A feed-pump of the Worthington pattern is provided to supply the boilers with feed-water. On the front end a large concrete floor is constructed to hold a supply of fuel, and the whole is covered in by a substantial building of wood and corrugated galvanised iron. Pumping-engine: The bed-plates are laid down and fixed in position, and both the high- and low-pressure cylinders are bolted on the beds, with the girders and pillow-blocks for the crank- and pumping-shafts; but none of these shafts are yet in position, the engine crank-shaft and fly-wheel, with spur- and pinion-wheels, not having yet come to hand. A large travelling crane is erected across the building overhead to lift the different portions of the machinery into position. This crane, although only guaranteed to lift 12 tons, has lifted the heaviest portions of the machinery into their places, some of these being 17 tons weight. A small steam starting-engine has yet to be erected alongside the pumping-engine. Concrete foundations were made at each side of the pumping-shaft connected with the main concrete block on which the pumping-engine rests, and on the top of this foundation two heavy wrought-iron girders have been placed across the shaft, and also over the whole length of the concrete on each side of the shaft. These girders are all riveted together and joined at each end with cross-girders, and firmly bolted down to the concrete foundations. Pillow-blocks are bolted on to the top of the girders to receive the axles of the quadrants. On the side next the pumping-engine two large diagonal wrought-iron girders are butted at the ends against the pillow-blocks on the girders for the quadrants, and at the other end, against the foundation for the pumping-engine, to act as struts, and to prevent any movement of the quadrant pillow-blocks or bed-girders. These struts are secured to engine foundation and girders at each end with strong bolts. The quadrants are made of wrought-iron and strongly riveted together. These are on the ground alongside the shaft ready to be lifted into position. The side connecting-rods for the quadrants are of wrought iron, and are on the ground, but the main connecting-rod has not yet come to hand. A capstan-engine, with two 6 in. cylinders, is erected, with screw-wheels, and also spur-wheels and pinions, having helical teeth, with winding-drum for capstan-rope, which is what is termed a 6 in. steel

SECTIONAL ELEVATION OF PUMP.  
 QUEEN OF BEAUTY SHAFT. THAMES-HAURAKI GOLDFIELDS, LTD.  
 — T.A. Dunlop, Manager.



TOTAL DEPTH OF ENLARGED SHAFT. 423' 0"







rope, being about 2 in. in diameter, and capable of lifting 20 tons. This capstan is provided with a powerful screw conical brake. The engine being of such small dimensions, the piston speed is very high, and is reduced down by the gearing described, so as to lift 20 tons at a moderate speed. Two sets of plungers have been fixed in position in the shaft at 327 ft. below the surface, and above the plunger-poles there is a large chamber cut out, where balance-bobs are placed to take the weight off the rods, and above this, directly below the end of the first rod, two beams are being placed across the shaft, each 9 ft. deep by 12 in. wide, to prevent the rods from going down in case of any accident or breakage occurring. Each of the plunger-rods is 10 in. in diameter, of solid steel, and are jointed every 30 ft. On each end of every rod there are two heavy collars about 13 in. in diameter. The ends of the rods are butted together, and a heavy cast-iron coupling bored out in the centre to admit the collars on the rods, which are made in two pieces. This coupling is slipped on each joint, and bolted together. In order to keep the rods firm at the joints, a cotter about 3 in. wide is driven through the coupling, and through the key-ways, cut in the ends of each collar on the rods, which wedges the collars on the rods hard up against the recess in the coupling, and keeps them firm. It is fixed below the lowest coupling, where the beams are placed across the shaft to prevent the rods going down. Both plungers discharge into one uprise column of pipes, and this column is now fixed in position to the surface. Notwithstanding the large size of the shaft where the pumps are placed—namely, 17 ft. 6 in. by 8 ft. 6 in. in the clear inside the timber—there is very little room in it when the pumps and rods are placed in position. Guides for the rods working in are also to be placed about 60 ft. apart, to prevent vibration on the downward stroke of the plunger-poles. Sinking-pumps: There are two draw-lift pumps on the ground, the uprise columns of which are 26 in. in diameter, to admit of the bucket being hauled up inside the column in the event of the water rising too fast to get the bucket taken out and replaced at the door-piece, directly above the working-barrel. The working-barrels of these draw-lifts are made with three heavy wings, which project beyond the outside of the pipe for about 18 in., and form a solid base to bear the whole weight of the column full of water. These large projecting wings were never anticipated, and when these pumps have to be put down, the centres dividing the winding from the pumping compartment will have to be taken out before they can be got into place. The wind-bores at the end of the suction-pipes for these two draw-lifts have holes in them to a height of 3 ft., so that there would always have to be a depth of 3 ft. of water before they would commence to lift any, and this would make the sinking of the shaft very expensive, as the men would always be working in water. It has now been decided not to put down these draw-lift pumps until the shaft is sunk to the desired depth, and, instead of these, two double-action Cameron steam sinking-pumps will be got, and used in sinking the shaft. As these pumps have a very short stroke they will keep the bottom of the shaft comparatively dry during the sinking operations. The manager has not yet got authority to order these sinking-pumps, which the Union Ironworks require ninety days to deliver at Auckland; so that it is a difficult matter to state at what date pumping operations will commence. Judging from what can be seen at the present time, there is no likelihood of commencing to pump any water from this shaft before December. One of the most complete air-compressors there is in the Australasian Colonies is erected on the foundation where the second pumping-engine is intended to be placed, if it is ever required. It is of the compound type, the cylinders being 19½ in. and 31 in. in diameter respectively, having water-jackets around the cylinders. It was intended to work this air-compressor with a separate steam-engine, but the engine was eliminated from the contract, with the view of working the compressor with a Pelton water-wheel; but the power required to drive this compressor is more than was anticipated by the manager, and it is now considered out of the question to get sufficient water from the county race to work this machine. This is to be regretted, as this air-compressor is required to supply compressed air to work the Cameron sinking-pumps, instead of steam, and in all likelihood a steam-engine will yet have to be procured to drive this compressor. The exhaust of compressed air instead of steam will always have the effect of drawing the noxious gases from the bottom of the shaft, and producing good ventilation. One of Tangyes winding-engines is erected, and everything is ready to commence sinking as soon as the pumps are in position and the erection of the pumping-engine completed. The winding-engine has double cylinders, with the winding-drums fitted with heavy brakes, worked by screw-lever. This engine and the capstan-engine, with all gearing, is erected in a separate building from the pumping-engine and air-compressor. A very compact compound-wound dynamo for lighting purposes is fixed in the same building as the pumping-engine and the compressor, but none of the lamps are yet fitted up. The whole of the workmanship in connection with the manufacture of this plant, and erection, are of the best class, and when once completed it will not only be the largest pumping plant in Australasia, but it will also be equal, if not superior, to any machinery yet manufactured in, or imported to, these colonies. It reflects the highest credit on the manufacturers, and all those who have charge of its erection. The manager, Mr. T. A. Dunlop, who has displayed marked ability in constructing the foundations, shafts, poppet-heads, and buildings in connection with it, has furnished the following report on the mine, which may afford additional information:—

“The object of the undertaking is to test the deep levels of the Thames Goldfield to a depth of 2,000 ft. To assist this object the Government granted a subsidy of £25,000, at the rate of pound for pound. The property consists of 250 acres, and is divided into three sections, known as the Queen of Beauty (47 acres), Deep Sinker (93 acres), and Deep Levels Consolidated (110 acres). The old Queen of Beauty shaft was down to a depth of 750 ft. The present company commenced operations by stripping, enlarging, and retimbering the shaft, the present size being 17 ft. 6 in. by 8 ft. 6 in. clear of timber. This was done down to the 327 ft. level, where a chamber 17 ft. 6 in. by 16 ft. 6 in. and 48 ft. deep was opened out, after which the sinking of the shaft at its former dimensions was resumed, and carried to a depth of 423 ft., at which point the water-level was reached, and thus prevented further sinking operations until such time as the new pumping machinery is erected and in working-order. The work of dismantling and removing the old machinery and buildings was then

taken in hand, the necessary excavations made, and the ground tested to obtain the most suitable site for the foundations of the new machinery. After carefully testing the ground by pile-driving, the site for the foundation of the new pumping-engines was fixed on the west side of the shaft. The area of this foundation was 70 ft. by 60 ft., and in this area forty piles, 12 in. by 12 in., were driven; but, as the solid formation had an underlie to the west, some piles were driven deeper than others before the solid formation was reached. The piles were then cut about 4 ft. from the ground, and the whole bound together by a layer of concrete 2 ft. in thickness, which was allowed to set firmly. On this smooth surface boxes were laid in various directions, of sufficient size to allow a man to enter, and upon these sixty-four perpendicular boxes, 6 in. by 4 in., and 18 ft. long, were placed. These were stayed and braced to keep them in position, so that the holding-down bolts from the engine-bed could be placed in position and secured below. Concrete was then placed to a depth of 18 ft., securing these boxes, and it was extended on the east and west side of the shaft to a depth of 12 ft., for the support of the pump quadrants, and thus on three sides of the shaft there is one massive concrete block fully 6,000 tons in weight. As this was required to carry such heavy machinery, it was decided by the Government Inspector and by the manager for the company that the very best Portland cement only should be used in its construction. One part of this cement to five parts of gravel and broken metal were thus used. The metal was broken on the ground by a rock-breaker of the Blake-Marsden type, the motive-power being obtained from a Pelton wheel. The amount of material excavated for the various foundations is estimated at 13,000 yards. The site for the capstan- and winding-engines was fixed on the south side of the shaft. Both these engines are in the same building, and are erected on concrete foundations, which are joined together. The foundation for the capstan-engine is 22 ft. 9 in. long, 11 ft. wide, and 7 ft. deep; and that of the winding-engine 15 ft. 3 in. long, 15 ft. 3 in. wide, and 8 ft. 9 in. deep. The necessary holding-down bolts were arranged in these foundations by providing boxes, in the same manner as described above in the case of the pumping-engine. The building in which the capstan- and winding-engines are situated is lofty and well lighted, and both engines are working smoothly and giving entire satisfaction. The present steam-power is provided by a portable boiler, with which the necessary connections are made. The winding-engines consist of a pair of what are known as first-motion engines, the cylinder of which is  $14\frac{1}{2}$  in., and having a stroke of 28 in. The winding-drums are of the latest design, fitted with clutch and steam-reversing gear. The rope is of steel wire,  $1\frac{1}{8}$  in. diameter. The man in charge occupies a central raised platform, from which he has a good view of the brace at the shaft. The capstan-engine is situated in front of and a little below the winding-engine. Its weight is 26 tons, and it is fitted with a wire-rope 2 in. in diameter, capable of lifting 25 tons. This is used for lowering or raising the heavy parts of the pumping machinery required in the shaft. The boiler-house is a fine building, 100 ft. long, 75 ft. wide, with side-studs 20 ft. high, and contains ten Lancashire double-flue boilers, each weighing about 19 tons. These are all placed in a line, and are set in fire-bricks bedded in fire-clay. The main flue with which they are connected consists of a passage 10 ft. high, 5 ft. wide, and leads to a chimney-stack which is 7 ft. 6 in. square at the base and a little over 100 ft. high. Each boiler is 30 ft. long and 7 ft. in diameter, and constructed so as to carry a daily working-pressure of 120 lb. to the square inch. The material of which they are constructed is Siemen's-Martin steel. The holes were drilled and the plates bent ready to be put together on arrival here. This work was accomplished by the firm of A. and G. Price, at the Thames, and each boiler was tested to withstand a pressure of 240 lb. per square inch before being delivered at the mine. Each boiler is fitted with a Lee-Howl's patent hot-blast forced-draught furnace for economising the consumption of fuel. A new set of poppet-legs has been erected, with cap-pieces capable of bearing a transverse working-strain of 400 tons. The legs are about 65 ft. in length, 2 ft. 6 in. square at the bottom, and tapering uniformly to 1 ft. 6 in. at the top. These are set into sole-pieces, which are firmly embedded in concrete. To further strengthen them they are well braced and stayed, and capable of resisting the greatest strain that they can ever be subjected to, even if a whole column of pipes were slung from the top. The pumping-engines, the whole of which have not yet arrived, consist of a pair of compound condensing engines, the high-pressure cylinder being 30 in. in diameter and the low-pressure 60 in., having a 5 ft. stroke. Both these have been placed in position. The compound air-compressors have also been erected, and are to be driven by water-power. They are capable of driving twelve  $3\frac{1}{2}$  in. rock-drills. The fly-wheel, which is rope-driven, is 18 ft. in diameter. The building in which the pumping-engine and air-compressing plant are erected is 70 ft. long, 60 ft. wide, and side-studs 28 ft. high. There is also erected in this building a travelling crane, with a capacity of 12 tons, and having a longitudinal and transverse motion. This is absolutely necessary for lifting the heavy pieces of machinery during erection, and also in case of repairs being afterwards required. For several weeks past work has been practically at a standstill, awaiting the arrival of further shipments of machinery. Three vessels are already on the way, and contain fully 200 tons more of the machinery required, some of which is expected to arrive almost daily, and the remainder by the end of June. As soon as all the machinery has come to hand and the pumps are in working-order the stripping, enlarging, and retimbering of the shaft will be continued to the No. 8 level, where a cross-cut has intersected a large ore-body known as the Vanguard reef. Simultaneous with operations on this reef, which will be the first ore-body worked, sinking will be continued down to the No. 11 level, where our three main ore-bodies will be operated upon. While ore is being won from the two levels above referred to, sinking will be continued down to 1,100 ft., and the No. 12 level will be opened out at a depth of 1,000 ft., thus leaving 100 ft. of a well. The electric-lighting plant has been completed in the various buildings by the suspension of numerous 16-candle-power incandescent lamps; and two large arc-lamps of 2,000-candle power are arranged about the poppet-heads, which serve to illuminate the brace and the top of the shaft. At the 327 ft. level a chamber has been opened out on the south, east, and west sides of the shaft for a depth of 48 ft. This chamber is for the reception of the first set of plunger gear, and large steel girders are fixed to carry two cisterns 10 ft. by  $4\frac{1}{2}$  ft. by

5 ft.; windbore for first set of plungers; top and bottom clack-piece; T piece to receive the rising main and air-vessel. The two 25 in. plungers are in position, and the necessary connections made with the rising main, which is completed up to the surface. 180 ft. of the 10 in. pump-rods have been connected. At the 270 ft. level two chambers, one on the east and the other on the west side of the shaft, have been excavated. These are for the side-levers to work the draw- or bucket-lifts, and are already in position."

*May Queen, Hauraki.*—The operations of this company for the past year have been confined to opening up the No. 1 and No. 2 Cardigan reefs on the No. 6 level from the shaft in the Saxon section of the property. The entire property consists of four sections of reefs—namely, the Saxon, May Queen, St. Hippo, and Lone Hand. A good deal of prospecting has been carried on near the surface in the two latter sections of the property, and recently a double-cylinder steam-engine and two Lancashire boilers have been provided, to be used for winding and pumping in a shaft proposed to be sunk near the boundary of the St. Hippo and Lone Hand sections.

The whole of the known payable ore was taken out of the lodes in the May Queen and Saxon sections down to the present water-level prior to the present company taking over the property, and, as there was no hope of being able to sink to a greater depth until the new drainage plant is erected at the Thames-Hauraki Company's shaft, the present company decided to construct a cross-cut from the lowest level in the Saxon workings, to prospect a portion of the mine in which no work had been done. This resulted in two new reefs being found, which are now called the Cardigan Nos. 1 and 2. Both these reefs are small, varying from 4 in. to 18 in., and so far as workings have been carried on the ore from the No. 2 reef has averaged 1 oz. gold to the ton. Where the No. 1 reef was cut the ore only contained about 5 dw. of gold per ton, consequently no work was done on this for some time; but after stoping was commenced on the No. 2 reef, and it was found to be payable for working, the No. 1 reef was driven on in an easterly direction, and recently specimen stone has been met with, and a level is now being constructed to work it. The May Queen shaft has been enlarged to 12 ft. by 5 ft. in the clear down to a depth of 520 ft., which is the present drainage-level at this shaft, and no further progress can be made in this section until drainage is effected at deeper levels. This company in particular is very anxious that the drainage appliances of the Thames-Hauraki Company be completed, as there is a rich chute of ore to be seen all along the floor of the lowest level in the Saxon, May Queen, and Cardigan lodes. Since the company commenced crushing in June last from the Cardigan No. 2 lode the yield of gold up to the end of April was 1,326 oz. 5 dw. from 1,296 tons of ore, the value of the gold being £3,576 10s. 1d., which is equal to a value of £2 15s. 2d. per ton of ore.

#### *Block XXVII. District.*

*Deep Sinker Section.*—Work in the Deep Sinker Section of the Thames-Hauraki Goldfields' property was commenced in July, 1896, by sinking a main pumping- and winding-shaft. The size of the shaft is 12 ft. by 5 ft., and the first 105 ft. of sinking was through alluvial drift, and no machinery was required up to this point. At this depth, however, water was met with, and arrangements were made for the purchase of a winding-engine and a 4 in. Tangye pump, which was considered capable of coping with the water in the shaft at that time. The winding plant erected was a most complete one of its kind, and is capable of winding to a depth of 1,000 ft. The engine is of the horizontal type, with cylinders 16 in. diameter and 30 in. stroke. It is powerfully geared, and has two winding-drums 9 ft. in diameter. Sinking was continued until December, 1896, when it was found that the Tangye was not suitable for further sinking, partly owing to the nature of the country being passed through containing gritty material, which had a deleterious effect upon the numerous valves connected with the pump. This was therefore discarded, and a 10 in. plunger and draw-lift pump erected, which has continued to work satisfactorily to the present time. Two sets of plunger gear in connection with the pump are already fixed, one at the 200 ft. level and the other at the 400 ft. level. The shaft has been sunk to a depth of 460 ft., and a chamber opened out at the 450 ft., leaving 10 ft. for a well. From this chamber a cross-cut has been started in a northerly direction to cut the Una and Vanguard reefs, which were cut at the surface level in the South British tunnel, and another cross-cut in a southern direction, to cut other well-known reefs. The northern cross-cut has been extended a distance of 250 ft. Hitherto the hauling has been done in buckets, but since commencing to open out at the 450 ft. level two patent safety-cages have been fitted in the shaft, so that the material is now brought to the surface in trucks. This section of the company's property is situated in the heart of the Thames Goldfield, and consists of virgin ground which has hitherto been unworked for want of capital to sink through the alluvial drift, and for the difficulty in securing a freehold for the shaft-site. The shaft is situated 2,200 ft. south of the Queen of Beauty shaft, and it is intended to drive from each shaft towards the other to effect a junction.

#### *Shortland District.*

*Deep Levels Consolidated Section.*—The work carried on in this section of the Thames-Hauraki Goldfields' property has been the driving of an adit tunnel. This has been driven into the hill known as Mount Pleasant for a total distance of 1,136 ft., at a depth of 150 ft. below the surface. The size of the drive is 5 ft. 6 in. at the bottom, 4 ft. 6 in. at the top, and 6 ft. 6 in. high. It is closely timbered the whole way, and steel rails are laid the whole length to remove the debris from the face. A drain in the centre, under the sleepers, is made to carry away the water. The object of this drive was to drain off the surface-water and to locate the main country-rock formation, which, so far, has for the most part been of a broken and disturbed character. A fair channel of country was penetrated in the first 400 ft., after which the ground again became very much broken, and the present face is penetrating a formation resembling the old bed of a river, from the presence of gravel and boulders.

*Karaka District.*

*Adelaide Mine* (Area, 22 acres; owners, Adelaide Gold-mining Company, No Liability).—The shaft is now 410 ft. in depth, and work has been carried on driving and stoping the reef, which is from 6 in. to 3 ft. in width. 458 tons was crushed, for 163 oz. 17 dwt. of gold; value, £478 2s. 6d. Twelve men were employed.

*May Queen Extended Mine* (Area, 49 acres; owners, May Queen Extended Gold-mining Company, No Liability).—Extensive prospecting works have been carried on at this mine—100 ft. of driving in the cross-cut and 400 ft. in the line of reef at the low level. A winze has also been sunk to a depth of 75 ft. to connect with the low level. Thirty-nine tons of quartz yielded a return of 44 oz. 19 dwt., valued at £121 7s. 4d. Three men were employed.

The *Claremont Claim*, owned by Mr. G. Bryant, has again produced a considerable quantity of gold, obtained from working on the junction of flinties with small leaders. Two hundredweight of specimens was crushed, for a yield of 181 oz. 11 dwt., valued at £482 2s. 4d. One man was employed.

*Gloucester Mine* (Area, 87 acres; owners, Gloucester Gold-mining Company).—This company's property is being vigorously prospected. A considerable amount of trenching and driving has been done, and a shaft sunk to a depth of 140 ft. It is intended shortly to erect a pumping- and winding-engine capable of sinking to a depth of 400 ft. In the course of development works, under the supervision of Mr. Thomas McCullough, a fair quantity of gold has been obtained from leaders and reefs in surface drives. The company has also secured the Lincoln Special Claim, and intends, if possible, to purchase the Manchester Claim, which should be of value, as the tributers discovered a body of quartz which gave good results under a test. Twelve men employed.

*Karaka Mines, Limited* (Area, 84 acres 3 roods 20 perches).—A large amount of work has been done in this claim in stoping and driving on No. 1 reef, and 170 ft. has been driven east and 215 ft. west. The reef, which is about 2 ft. wide, looks promising, good gold being occasionally seen in the stone. The mine is well timbered, and the ventilation is good. Seven men employed. Mr. Dunlop, who has the supervision of the mine, reports as follows: "It was purchased from the original shareholders by the Austinfriars Finance Syndicate, of London. The management is in the hands of the Thames Exploration Syndicate. During past twelve months a staff of men has been employed opening up several of the reefs. The principal work has been confined to two reefs cut in the adit level, and known as No. 1 and No. 2. A total distance of 650 ft. has been driven on the No. 1 reef, which averages 4 ft. in thickness, until it junctions with the No. 2, after which its average width is from 7 ft. to 8 ft. Several test lots have been crushed by the ordinary wet process, and have given an average yield of about £2 per ton. The No. 2 reef is 5 ft. in thickness. The height of backs available at various points is 290 ft., 270 ft., and 320 ft. A battery-site close to the county water-race and a water-race in the Karaka Creek have been secured. The company is now considering the erection of a ten-head battery to test the reefs regularly, and to help to pay the working-expenses of opening up the mine. The Hague Smith reef has also been opened up from the creek-level. A 5-ton parcel has been shipped to London for experimental purposes."

*Una Hill and Te Papa District.*

*Occidental Mine* (Area, 50 acres; owners, Occidental Gold-mining Company).—Prospecting work has not been carried on to any great extent during the year. Six men were employed earlier in the year, but the claim is now protected.

*Fortuna Mine* (Area, 61 acres; owners, Fortuna-Hauraki Gold-mining Company).—The work carried on in this mine has been clearing out old workings, and No. 1 level has been driven from the cross-cut for a distance of 175 ft. The reef, which is from 8 ft. to 10 ft. in width, is known as the Gibraltar reef. The Magnolia No. 3 reef has also been opened at No. 2 level. The quartz is about 9 ft. in width where it was cut through, and, as this reef is well opened up, large blocks of quartz can be readily stoped out. A temporary pumping and winding plant has been erected at the Old Consols shaft, and the water lowered to the No. 3 level, 200 ft. from the surface. A drive is to be extended from this level to cut the Gibraltar and the other reefs at this depth. A battery of ten stamps is to be erected for the purpose of thoroughly ascertaining the value of the many reefs and leaders in this ground. The reefs are well worthy of the expenditure needful for opening them up. The Hague Smith reef, which runs parallel with Te Papa Gully, will cross the strike of the other reefs, and probably will be the means of causing deposits of gold at the junctions. Thirty-three men were employed.

*Hape Creek District.*

*Anchor Mine* (Area, 100 acres; owners, Ethel Reef Gold-mining Company).—The operations on the ground have been chiefly clearing old levels and obtaining parcels of quartz from the different reefs. 180 tons was crushed, for 90 oz. of gold; value, £234. Fifteen men were employed. A party of four tributers crushed 23 tons, for a yield of 42 oz. 10 dwt. of gold; value, £110 10s.

*Mascotte Limerick Mine*.—Some prospecting work was done in the earlier part of the year, but the claim has now been abandoned.

*Puriri District.*

*Puriri Mine* (Area, 100 acres; owners, Puriri Gold-mining Company).—Two men were employed in prospecting operations for nine months in the year, but no returns of gold have been obtained.

The London and New Zealand Exploration Company have carried an extensive prospecting works in the Hit-or-Miss Claim. One low-level cross-cut has been driven 564 ft. through hard rock, and two drives along reefs, one 345 ft. and the other 305 ft., those veins being from 6 in.

to 18 in. in width. Two other cross-cuts, 20 ft. and 55 ft. in length, were also driven. No return of gold has been made; therefore it would appear that no crushing took place. Thirteen men were employed.

*Empress of India Mine* (Area, 85 acres and 37 perches).—A large amount of work has been done in this mine, in which forty men are employed. 4,170 ft. of driving has been done, the greater part being on the reefs. Winzes have been sunk, and other prospecting work done. The reefs and leaders traversing the property vary from 3 in. to 4 ft. in width. An option is held over the property by an English company.

#### *Otunui District.*

Very little prospecting was done in this district during the year.

#### *Mangakirikiri District.*

A discovery of cinnabar was made by the Lowrie Brothers on the western side of Otunui Creek, about midway between the Kauaeranga Creek and the Otunui Mines. Several outcrops are seen on the range from 200 ft. to 500 ft. above the creek-level, in which small pockets of cinnabar are to be found. The rock formation is apparently due to thermal agency, and the matrix consists of this rock and bunches of quartzite. The vermilion colour is clearly visible in the quartz and in the overlying surface. Prospects washed in the dish show a tail of cinnabar. The same is also got by pounding the solid quartz and panning off small parcels.

The quantity of work done is insufficient to enable a fair opinion to be given as to the extent of the matrix, and whether it occurs in the form of a reef or lode. The appearance of the places where the cinnabar is to be seen gives encouragement for further exploration, when possibly a deposit of value may be met with.

Mr. Alexander McKay, the Geologist for the Mines Department, who visited the place subsequent to my seeing the outcrops, has furnished the following report:—

“I have the honour to report that, on the 26th April, I visited the cinnabar lode occurring in the Kauaeranga Valley, about six miles from where the river enters the Firth of Thames at Shortland. The mercury deposits occur within the valley of Mangakirikiri Creek, about a mile from where that joins the Kauaeranga, and are more particularly located along the south-west side of Otunui Creek, a tributary of the Mangakirikiri. Mercury-ore as cinnabar is found along the hill-slopes on the right bank of the creek over a distance east and west of about 6 chains, and from the crest of the ridge 500 ft. to the level of the creek, which may be some 200 ft. above sea-level. The exact location is about a mile north-west of the Kauaeranga River, and the most westward and highest of the outcrops examined appears near the crest of the ridge, at the height indicated, as a series of sinter blocks so arranged that they appear to dip to the east, and indicate the occurrence of a solid lode in the near neighbourhood, but as yet this has not been traced at this the highest outcrop. Distinct traces of cinnabar are to be found here both in the quartz blocks and in the country-rock upon which they rest, and to all appearances there is here the outcrop of a band or stratum of highly silicious country, carrying a percentage of mercury-ore. Two or three chains to the eastward, at a slightly lower level, another outcrop of quartz-carrying cinnabar occurs. This also strikes north and south, and dips to the east, at angles varying from 40° to 48°. The stone varies from 3 ft. to 4 ft. in thickness, and at various horizons, principally in the middle of the lode, carries ore that itself varies from medium to rich. Some work has been done at this place to expose the lode along its strike, and this work shows that both this and the higher outcrop is underlain by a grey rock, consisting mainly of feldspar corresponding to the kindly sandstone of the miner, while in both cases the more silicious deposit is overlain by breccias and tufaceous sandstone that evidently are of younger dates. Descending the slope eastward towards the Mangakirikiri Creek, some 6 chains, a third exposure of quartz-rock carrying cinnabar is seen, which has been bared at three places sufficiently to show that its extent is considerable. The ore at this place is more generally distributed throughout the stone than at either of the two localities mentioned as occurring higher up the slope of the hill, and from stone which at first sight shows little trace of the presence of cinnabar a fair prospect can be obtained by the rudest method of crushing and panning off. Passing to the south-east along the middle slope of the hill a constant exposure of quartz-rock is met with, which at several places shows the presence of cinnabar; and at one place there is a very considerable development of quartz-rock, forming a line of cliffs which, though not closely examined, seemed likely to carry the ore of mercury, being similar to the outcrops already mentioned. More to the east, masses of quartz are met with on the slope of the hill, and as loose boulders in the hollow forming the source of a small creek descending to the Mangakirikiri, and here also it was said prospects of cinnabar could be obtained from the soil and near the surface. Finally, near the crest of the ridge, the most easterly of the various prospecting holes is situated. Here but little work has been done—not more than to prove the presence of the ore, and the quartz matrix seems to be but feebly developed. I was informed that some 12 chains to the westward of this area good prospects of cinnabar could be washed from the soil, and that masses of quartz there occurred similar to what appears within the area more particularly prospected, and which is here reported on. Numbers of analyses have been made of the stone at the School of Mines, Thames, and I am informed that the results have been from 2 to 25 per cent. as from the least promising that showed cinnabar to the best that could be found. I obtained samples which, I think, should exceed 25 per cent., but such rich ore is limited in amount; while, so far as I could judge, there is a considerable amount of medium richness. As to the nature of the deposit, I conclude that the ore matrix is the deposit of a thermal spring which seems to have been active at different periods, during the intervals between which activity deposits of another kind—ash and tufa beds—were accumulated over the first-formed sinter deposits. The character of the deposit as above indicated is demonstrated by the occurrence of numerous dicotyledonous leaves in the upper part of the sinter deposits or in

the coarser matrix of the overlying tuffs. The deposit is thus likely to be confined to the limits of the property within which it occurs, there being little evidence of the occurrence of similar deposits to the west and south, while more to the north and north-north-west similar quartz deposits, so far as known, contain gold only. Far too little work has been done on the property to enable an estimate of the extent and true value of the ore, but from what could be seen, and as far as I could judge, there is warrant for the further opening-up and developing of the property. The stone already tested proves to be at places of a paying character, and, while the whole of the deposit may not be so rich, it has still to be considered that much richer stone may be discovered than any yet found. Mercury and the ore of mercury (cinnabar) occurs in connection with thermal springs at Ohaeawai, in the Bay of Islands district of Auckland. There the thermal conditions interfere with the working of the deposit to any considerable depth from the surface. Here, within the watershed of Otunui Creek, thermal action has long since ceased, and no such difficulties are likely to be experienced in working the ore. The ore-bodies are favourably placed for working, and, as thermal deposits, are at or near the surface, while yet, as in the Karangahake and Waihi districts, there is the possibility of thick deposits having considerable linear extension descending to considerable depth, and forming reef-like masses under the more superficial deposits. I forward samples taken by myself, so that if desired the returns here given may be checked at Wellington. Of the samples sent, Nos. 1 and 2 are from the second highest outcrop, as above described; No. 3, the largest sample, is from the outcrop 5 or 6 chains further down the slope of the hill towards the Mangakirikiri Creek.

#### *Hihī District (Upper Kauaeranga).*

A new discovery was made during the early part of the year. Several parcels of rich stone were crushed, yielding 48 oz. 16 dwt. of gold; value, £3 3s. per ounce.

#### *Matatoki and Kirikiri Districts.*

The mines held in these localities have been idle during the greater part of the year.

#### *Neavesville District.*

Very little work of any importance has been carried on in this district during the year.

#### *Tairua River District.*

*Broken Hill Mine* (Area, 340 acres).—A considerable amount of money has been expended on this property, but subsequent to the purchase of the battery, all arrangements having been made for its erection, and the acquisition of a water-race and tramway to connect with same, it was discovered that no stone of a payable character had been found to warrant the outlay. Work has consequently been stopped, pending instructions from the London directorate. Thirty men employed.

*Albert Mine* (Area, 130 acres).—A large amount of prospecting work has been done in this mine, and the management is sanguine as to the ultimate results, though at present nothing of importance has been discovered.

*Anglo-Continental Company.*—A large amount of prospecting was done, but, in consequence of the poor prospects met with, work on the properties held by the company was for a time stopped, though it is probable operations will be resumed shortly.

#### *Ohui District.*

The *Last Chance* (30 acres) and the *Golden Hill* (100 acres); owners, J. H. Harrison and Herbert Gentles.—Prospecting work to a limited extent was carried on by Seaver Brothers, who held an option to purchase the ground. Since they ceased operations the mine has been let on tribute to Mr. George Clarkson for a term of four years. A stamp-mill capable of crushing 50 tons per week is to be erected.

A large number of men were employed in prospecting operations in this district during the early part of the year, but most of the claims are now under protection. A six-stamp battery has been erected, but no returns have yet been received.

#### *Whangamata District.*

*Whangamata Proprietary Mine* (Area, 306 acres; owners, Whangamata Proprietary, Limited, London).—The principal work carried on during the year was in driving No. 1 level, which is 760 ft. on the reef, and No. 2 level 809 ft. The main reef varies in width from 3 ft. to 17 ft. The richest ore averages about 5 ft. The other portions of the quartz, although gold-bearing, are of much less value. The lode matter consists of a whitish quartz generally exhibiting a banded structure of wavy laminæ, frequently coloured with sulphide of silver. Above No. 1 level the backs vary from 20 ft. to 177 ft. at the greatest height. The distance from No. 1 to No. 2 level is 77 ft., and a cross-cut has been driven for a distance of 610 ft., which will cut the reef 100 ft. below No. 2 level. A dry-crushing plant, consisting of two stone-breakers of Blake type, one revolving ore-dryer, one Krupp mill, twelve wooden cyanide-vats each 20 ft. in diameter, six berdans, with all the ordinary accessories, is now being erected. The machinery is to be driven by a 6 ft. Pelton wheel. Thirty men were employed.

*Wentworth Mine.*—In this mine two reefs, about 2 ft. in thickness, and believed to contain payable gold, have been driven on. Nine men were employed in the mine and seven in constructing a water-race. It is the intention of the company to erect a battery.



In the Phoenix, Golden Mine, Golden Fall, and several other mines extensive prospecting operations have been carried on, but owing to poor results work was discontinued throughout the district, with the exception of the Whangamata and Wentworth Mines.

## OHINEMURI DISTRICT.

This district comprises the County of Ohinemuri, which lies between the Thames, Piako, and Tauranga Counties. Some of the most extensive mining plants to be found in Australasia are situated in the district, and consequently mining operations are carried on with great energy.

The following list of claims will show the large number of areas occupied for mining purposes:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Ohinemuri.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
22/4/88	A. B. P. 10 0 25	Karangahake	I.	Aroha ..	Abbey ..	New Zealand Crown Mines.
2/6/96	19 2 12		II., VI.	Ohinemuri ..	Acorn ..	The Oakley Gold-mining Co. (Ltd.).
17/2/96	100 0 0	Waihi ..	XV.	Ohinemuri ..	Aladdin's Lamp ..	Waihi Reefs Gold-mining Co. (N.L.).
4/10/95	100 0 0	Komata ..	X.		Alfred ..	Omega Gold-mining Co. (N.L.).
17/2/96	86 2 0	Waitekauri ..	X., XIV.		Alfred Extended ..	Exchange Gold-mining Co. (N.L.).
1/2/96	99 2 9		XIV.		Alhambra ..	Belmont Gold-mining Co. (N.L.).
31/12/95	26 1 32		X.		Alpha Extended ..	Waitekauri Consolidated Gold-mining Co. (Ltd.).
31/12/95	50 0 0	Waihi ..	XVI.		Amaranth ..	Union Waihi Gold-mining Co. (Ltd.).
27/2/96	100 0 0	Waitekauri ..	X.		Anglian ..	Waitekauri Union Claims (Ltd.).
19/2/97	100 0 0		XIII., XIV.		Arcadia ..	Gregory B. Ormond.
23/7/96	57 1 16	Karangahake	II.	Aroha ..	Aster ..	The N.Z. Crown Mines (Ltd.).
25/4/96	100 0 0	Whangamata	VII.	Ohinemuri ..	Atlas ..	Atlas Gold-mining Co. (N.L.).
19/2/97	77 3 0				Auckland Chief ..	Edward Joseph Smith.
19/2/97	99 0 31				Auckland Prince ..	
19/2/97	100 0 0		III., VII.		Auckland Princess ..	
19/2/97	100 0 0		VII.		Auckland Queen ..	James D. Foley.
3/9/96	71 0 1	Owharua ..	XIV.		Augusta ..	Thomas Ussher.
23/3/96	100 0 0	Waitekauri ..	X.		Australia ..	Waitekauri Union Claims (Ltd.).
24/3/96	99 2 16	Owharua ..	XIV.		Bain ..	Ohinemuri Syndicate.
8/8/96	100 0 0	Waihi ..	XVI.		Beacon Hill ..	Beacon Hill Gold-mining Co.
1/2/96	98 0 6	Owharua ..	XIV.		Belmont ..	Belmont Gold-mining Co. (N.L.).
8/5/97	97 1 4	Whangamata	VII., XI.		Belvoir ..	H. A. Banner.
2/10/97	100 0 0		V.	Te Puke ..	Ben Lomond ..	John Cameron Galbraith.
25/3/96	100 0 0	Maratoto ..	VI.	Ohinemuri ..	Black Star ..	William Horne.
23/12/96	47 1 35	Karangahake		Aroha ..	Blarney Stone ..	Charles W. Cave.
9/9/97	50 3 34	Maratoto ..		Ohinemuri ..	Boogum ..	Daniel Allen.
20/8/96	50 3 34				Boojum ..	Maurice Kelly.
2/6/96	18 1 35				Boomerang ..	A. P. H. Cashel.
23/4/97	98 0 0		V., IX.		Bradford ..	Alfred William Sergeant.
2/6/96	14 3 0	Karangahake	II.	Aroha ..	Braemar ..	James William Shaw.
31/12/95	97 2 0	Waihi ..	XV., XVI.	Ohinemuri ..	Bright Smile ..	Waihi Reefs Gold-mining Co. (N.L.).
30/11/96	100 0 0		IV.	Aroha ..	Bright Star ..	Don of Waihi Gold-mining Co. (N.L.).
19/6/95	100 0 0		XVI.	Ohinemuri ..	Brilliant ..	Waihi Consolidated Gold-mines (Ltd.).
27/2/96	100 0 0		XV., XVI.		Britannia ..	The Waihi Gold-mining Co. (Ltd.).
17/10/95	80 2 5	Waitekauri ..	X.		Burbank ..	Waitekauri Consolidated Gold-mines (Ltd.).
16/1/96	16 2 20	Whangamata	III.		Burleigh ..	Robert Kelly.
7/5/95	30 0 0	Komata ..	X.		Byron Bay ..	Byron Bay Gold-mining Co. (N.L.).
5/5/96	6 3 20	Waitekauri ..	X., XI.		California ..	Waitekauri Union Claims (Ltd.).
10/4/97	93 2 0	Whangamata	VII.		Captain ..	John Mason Sharp.
8/10/95	29 3 0	Waitekauri ..	X.		Central ..	Waitekauri Union Claims (Ltd.).
14/6/97	89 3 0				Central Consuls ..	Waitekauri Union Claims.
14/7/96	4 1 20				Central Extended ..	Waitekauri Junction Gold-mining Co. (N.L.).
8/10/95	25 0 16					Waitekauri Union Claims (Ltd.).
17/9/95	14 2 20	Owharua ..	II., IV.	Aroha Ohinemuri	Charles Victor ..	Owharua United Gold-mining Co.
4/10/95	100 0 0	Waitekauri ..	X.		Christina ..	Omega Gold-mining Co. (N.L.).
8/8/96	80 0 0	Waihi ..	XV.		Christmas Box ..	Waihi South Gold-mining Co. (Ltd.).
23/4/97	85 0 0	Waitekauri ..	XIV.		Clansman ..	Charles Collins.
9/9/97	80 0 0				Colewinser ..	Frederick Butcher.
10/12/95	94 2 0	Karangahake	II.	Aroha ..	Crescent ..	Crescent Gold-mining Co. (N.L.).
16/3/96	100 0 0	Waitekauri ..	X.	Ohinemuri ..	Crosscut ..	The Waitekauri Gold-mining Co.
8/5/96	100 0 0				Crosscut Extended ..	
5/5/97	50 0 0				Crown Imperial ..	Crown Imperial Gold-mining Co.
16/6/96	90 0 0	Karangahake	I.	Aroha ..	Crown Mines ..	The New Zealand Crown Mines Co. (Ltd.).
2/6/93	98 0 31		I., II.			
16/11/97	58 1 0	Waitekauri ..	III.	Ohinemuri ..	Crown Nimrod ..	Joseph Barber.
24/10/96	100 0 0	Maratoto ..	VI.		Daniel Boone ..	Robert Kelly.
30/5/96	100 0 0	Waihi ..	XV.		Dauntless ..	Edward Mann Corbett.
25/3/96	100 0 0	Owharua ..	XIV.		Dawn of Hope ..	Edward Bain.
8/8/96	89 3 32				Dawn of Hope Surplus ..	James Smyth.
1/2/96	100 0 0	Waihi ..	XIV.		Day Dawn ..	Thomas Mace Humphreys.
19/2/97	100 0 0	Maratoto ..	VII.		Day Spring ..	John Edward Banks.
23/3/96	100 0 0	Waihi ..	XIV.		Deep Lead ..	Deep Lead Gold-mining Co. (N.L.).
28/7/96	3 0 0	Waitekauri ..			Diamond ..	Peter Prudence.
10/12/95	75 0 8	Waihi ..	I., XIII.	Aroha ..		W. H. Pearce and W. Hellaby.



**ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—continued.**

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
80/5/96	A. B. P.	Waihi ..	VII.	Ohinemuri	Dixon No. 1 ..	Mataura Gold-mining Co. (N.L.).
23/3/96	100 0 0	..	XI.	..	Dublin ..	James Corbett.
13/9/95	87 0 11	Karangahake ..	I., II.	Aroha ..	Earl of Glasgow ..	New Zealand Crown Mines (Ltd.).
8/8/96	89 0 26	Waitekauri ..	X., XIV.	Ohinemuri	Edward Norman ..	Norman Proprietary Gold-mine (Ltd.).
25/4/96	94 1 12	Owharoa ..	XIV.	..	Elliot ..	Ohinemuri Syndicate.
19/11/95	30 0 0	Waitekauri ..	X.	..	E.M.C. ..	The Waitekauri Union Claims (Ltd.).
18/2/96	30 0 0	..	..	..	E.M.C. Extended ..	..
23/4/95	9 0 26	Karangahake ..	I.	Aroha ..	Emerald ..	Woodstock North Gold-mining Co.
19/2/97	100 0 0	Waitekauri ..	III.	Ohinemuri	Emerald Isle ..	Robert C. Speer.
23/12/96	80 0 0	..	III., VII.	..	Emerald Isle Ext. ..	Samuel Driffin.
13/1/97	36 2 25	Maratoto ..	VI.	..	Emperor ..	George Loram.
30/4/96	100 0 0	..	..	..	Excellent ..	Wilfred Rathbone.
24/3/96	38 0 9	Karangahake ..	II.	Aroha ..	Excellior ..	Excellior Gold-mining Co. (N.L.).
14/9/96	97 2 35	Waitawheta ..	VI.	Ohinemuri	Express ..	Guy Fosberry Reynolds.
19/6/95	100 0 0	Waihi ..	XVI.	..	Favona ..	Waihi Consolidated Gold-mining Co. (Ltd.).
28/8/95	100 0 0	Owharoa ..	II.	Aroha ..	Fern Spur ..	Waihi Gold-mining Co. (Ltd.).
23/7/96	100 0 0	Wharekirau-punga ..	XIV.	Ohinemuri	Fiery Cross ..	Fiery Cross Gold-mining Co. (N.L.).
5/5/97	100 0 0	Whangamata ..	VIII.	..	Florence ..	Hikutaia Gold Syndicate (Ltd.).
23/7/96	100 0 0	Maratoto ..	..	..	Fortunatus ..	Waitekauri King Gold-mining Co. (N.L.).
28/7/96	6 1 0	Waitekauri ..	XIV.	Ohinemuri	..	..
23/4/97	48 1 0	Waihi ..	XV.	..	Gem of Waihi ..	James George Wilson.
7/11/95	20 2 32	Waitekauri ..	VI.	..	Globe ..	Waitekauri United Gold-mining Co. (Ltd.).
27/2/96	90 0 0	..	XIV.	..	Goleonda ..	Sovereign Gold-mining Co. (N.L.).
23/12/96	70 0 0	Karangahake ..	II.	Aroha ..	Golden Age ..	Frederick Richard Quinton.
23/12/96	93 2 30	..	II., VI.	..	Golden Age Ext. ..	..
24/3/96	27 3 0	..	I.	..	Golden Crown No. 2 ..	Golden Crown No. 2 Gold-mining Co. (N.L.).
16/8/96	100 0 0	Waitekauri ..	X., XI.	Ohinemuri	Golden Cross ..	Waitekauri Gold-mining Co. (Ltd.).
3/9/96	56 2 37	Karangahake ..	I.	Aroha ..	Golden Fleece ..	Golden Fleece Gold-mining Co. (N.L.).
19/2/97	40 2 20	Waihi ..	XV.	Ohinemuri	Golden Lure ..	Norman F. J. Hazard.
3/6/96	67 2 25	Karangahake ..	I.	Aroha ..	Golden Reefs Ext. ..	Robert Stockpole, jun.
27/2/96	96 0 0	Waihi ..	XV., XVI.	Ohinemuri	Golden Run ..	Waihi Gold-mining Co. (Ltd.).
13/11/95	100 0 0	Waitekauri ..	X., XIV.	..	Golden Spur ..	Golden Spur Gold-mining Co. (N.L.).
20/5/97	25 3 10	Waihi ..	XV.	..	Goldenton ..	William H. Potter.
28/8/96	100 0 0	Wharekirau-punga ..	VII.	..	Goldstream ..	The Goldstream Gold-mining Co. (N.L.).
2/9/96	100 0 0	Waitekauri ..	XI.	..	Gothic ..	Joseph Thorne.
30/11/96	89 3 7	..	X.	..	Grace Darling ..	Grace Darling Gold-mining Co.
22/10/95	80 0 0	..	..	..	Grafton ..	Grafton United Gold-mining Co. (N.L.).
17/2/96	100 0 0	..	..	..	Grafton No. 2 ..	..
27/2/96	96 0 0	..	..	..	Grafton No. 3 ..	..
23/3/96	90 0 0	Waihi ..	XVI.	..	Grand Junction ..	Waihi Grand Junction Gold-mining Co. (Ltd.).
7/10/96	91 1 0	..	XII.	..	Great Central ..	John Murdoch Ross.
12/10/96	90 2 8	Maratoto ..	VI.	..	Great London ..	William Henry Aitken.
12/10/96	87 0 0	..	..	..	Great London Ext. ..	..
22/7/95	98 2 30	Waihi ..	XV.	..	Haines Morrin ..	Waihi Consols Gold-mining Co.
25/6/96	100 0 0	Karangahake ..	XIII., XIV.	..	Heroules ..	The Heroules Gold-mining Co. (N.L.).
22/10/95	23 0 32	Waitekauri ..	XIV.	..	Heroic ..	William J. Cornes.
27/10/96	28 0 32	..	..	..	Huanui ..	Lionel McLellan.
13/11/95	48 3 25	..	X.	..	Huanui ..	The Huanui Gold-mining Co. (N.L.).
3/9/96	100 0 0	Owharoa ..	XIV.	..	Huntley ..	John F. Andrew.
27/2/96	62 0 15	Karangahake ..	II.	Te Aroha ..	Imperial ..	Imperial Gold-mining Co. (N.L.).
3/6/96	100 0 0	Komata ..	X.	Ohinemuri	Ingall ..	Godefroi Drew Ingall.
13/11/95	49 0 12	Waitekauri ..	XIV.	..	Iota ..	Golden Waitekauri Gold-mining Co. (N.L.).
3/6/96	100 0 0	..	..	..	Iota Extended ..	Ditto.
8/7/97	29 1 10	..	X., XIV.	..	Iolanthe ..	Daniel Allen.
8/8/96	100 0 0	Maratoto ..	VI.	..	Irving ..	Irving Gold-mining Co. (N.L.).
25/4/96	72 0 12	Karangahake ..	XIV.	Aroha ..	Ivanhoe ..	Ivanhoe Gold-mining Co. (N.L.).
18/12/96	30 0 0	Waitekauri ..	XIV.	Ohinemuri	Jewel ..	Jewel Gold-mining Co. (Ltd.).
27/9/97	54 3 10	..	..	..	Jewel ..	Jewel Gold mining Co. (N.L.).
5/5/96	24 3 10	..	..	..	Jewel Extended ..	Jewel Gold-mining Co. (Ltd.).
10/11/87	108 0 15	..	..	..	Jubilee ..	The New Zealand Jubilee Gold-mining Co. (Ltd.).
25/4/96	78 3 35	Maratoto ..	VI.	..	Kapai Kaiser ..	William Horne.
6/8/95	30 0 0	Karangahake ..	II.	Aroha ..	Karangahake ..	Karangahake Gold-mining Co. (N.L.).
27/10/96	30 0 0	..	..	..	Karangahake Reef ..	Lawrence McNamara.
27/2/96	59 0 15	..	I., II.	..	Karangahake South ..	Charles Frederick Reid.
30/11/96	56 0 0	Katikati ..	IV.	Aongatete	Katikati Prospectors Ext. No. 1 ..	Edward F. Buckworth.
18/2/96	5 1 32	Waitekauri ..	XIV.	Ohinemuri	Keep-it-Dark ..	New Zealand Jubilee Gold-mining Co. (Ltd.).
27/10/96	10 3 19	Owharoa ..	..	..	Kenilworth ..	Ohinemuri Syndicate (Ltd.).
23/12/96	94 0 6	Maratoto ..	VI.	..	King ..	John Morrissey.
8/8/96	44 0 0	Komata ..	X.	..	Komata Chief ..	Komata Chief Gold-mining Co. (N.L.).
14/9/95	100 0 0	..	..	..	Komata Consolidated ..	Komata Queen (Ltd.).
23/4/97	47 3 10	..	V., IX.	..	Komata Eldorado ..	Peter MacFarlane.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
21/5/95	A. R. P.	Komata ..	X.	Ohinemuri	Komata Extended	Komata Queen (Ltd.).
1/3/97	100 0 0	" ..	IX., X.	"	Komata Gem ..	Alfred William Sergeant.
25/6/96	100 0 0	" ..	X.	"	Komata King ..	Komata King Gold-mining Co. (N.L.).
23/7/96	98 1 37	" ..	"	"	Komata Queen ..	Komata Royal Gold-mining Co. (N.L.).
17/8/95	79 1 24	" ..	"	"	Komata Reefs ..	Komata Reefs Gold-mining Co. (Ltd.).
18/11/95	100 0 0	" ..	"	"	Komata Reefs Ext.	John Mason Sharp.
23/2/98	100 0 0	" ..	"	"	"	James Bowen Pain.
7/5/97	19 0 11	" ..	"	"	Komata Union ..	Alfred T. Thorp.
8/6/96	100 0 0	" ..	"	"	Komata West ..	George Burgess.
16/10/96	14 2 10	Karangahake	I.	Aroha ..	Lioness ..	Thomas Herbert Biggs.
23/7/96	86 2 13	Maratoto ..	VI.	Ohinemuri	Liverpool ..	Newell B. Lusk.
7/4/96	64 2 0	Waitekauri ..	XIV.	"	Londonderry ..	Waitekauri No. 2 Gold-mining Co. (N.L.).
25/6/96	100 0 0	Maratoto ..	VI.	"	Long Drive ..	Edward M. Corbett.
29/6/96	100 0 0	" ..	"	"	Lord Rosebery ..	Nathaniel Dunlop.
7/10/96	46 1 5	" ..	"	"	Lord Rosebery Ext.	"
3/6/96	100 0 0	" ..	"	"	Lord Salisbury ..	Henry M. Shepherd.
29/11/97	100 0 0	" ..	"	"	"	Arthur Parkinson.
6/8/96	80 0 0	" ..	VI., X.	"	Lydia ..	Hikutaia Gold Syndicate (Ltd.).
19/3/97	50 0 8	" ..	VI.	"	MacGregor ..	Walter Thorp.
5/9/89	14 2 25	Owharoa ..	XIV.	"	Madden's Folly ..	Ohinemuri Syndicate (Ltd.).
14/3/96	100 0 0	Waihi ..	III.	Aroha ..	Maid of Erin ..	Andrew Cunningham.
10/12/95	100 0 0	" ..	"	"	Maid of Honour ..	Queen of Waihi Gold-mining Co. (N.L.).
23/7/96	100 0 0	" ..	XIII., XIV.	Ohinemuri	Mammoth ..	Heracles Gold-mining Co.
28/7/96	25 2 0	" ..	XIII.	"	Mammoth Ext. ..	Heracles Gold-mining Co. (N.L.).
19/2/97	86 1 12	Waitekauri ..	XIV.	"	Mangakara United	The Mangakara United Gold-mining
					No. 1	Co. (N.L.).
24/10/96	98 1 32	" ..	"	"	Mangakara United	The Mangakara United Gold-mining
					No. 2	Co. (N.L.).
23/8/96	100 0 0	Komata ..	X.	"	Marburg ..	Waitekauri Union Claims (Ltd.).
25/3/96	100 0 0	Maratoto ..	VI.	"	Marguerite ..	Herbert Gentles.
17/2/96	100 0 0	Karangahake	II.	Aroha ..	Maritana ..	Maritana Gold-mining Co. (N.L.).
15/5/96	82 1 20	Maratoto ..	V.	Ohinemuri	Maratoto United ..	Hikutaia Gold Syndicate (Ltd.).
27/2/96	100 0 0	Waihi ..	XV., XVI.	"	Martha ..	Waihi Gold-mining Co. (Ltd.).
27/2/96	100 0 0	" ..	XI.	"	Martha Extended	Martha Ext. Gold-mining Co. (N.L.).
23/7/96	88 1 0	" ..	"	"	Matawai ..	"
20/5/97	29 3 4	Maratoto ..	VI.	"	Melbourne Cup ..	Thomas Kneebone.
18/2/96	29 3 4	" ..	"	"	"	James Nicholls.
8/5/96	100 0 0	" ..	"	"	Mexico ..	Herbert Gentles.
14/9/96	100 0 0	Komata ..	VI., X.	"	Microphone ..	William Thorne.
23/4/97	85 0 83	Whangamata	VII., VIII.	"	Militia ..	George Sievwright.
17/9/95	12 0 22	Waitekauri ..	X.	"	Missing Link ..	Waitekauri Extended Gold-mining Co. (Ltd.).
8/6/96	34 0 6	" ..	XI.	"	Monarch Extended	Waitekauri Monarch Gold-mining Co. (N.L.).
23/7/96	75 2 30	Owharoa ..	XIV.	"	Morgan ..	Ohinemuri Syndicate (Ltd.).
23/8/96	95 2 32	Waitekauri ..	X.	"	Nebraska ..	Waitekauri Union Claims (Ltd.).
23/7/96	100 0 0	" ..	XIV.	"	Nelson ..	Mangakara United Gold-mining Co. (N.L.).
27/2/96	52 2 0	Karangahake	II.	Aroha ..	Nevada ..	David Snodgrass.
27/2/96	46 0 0	" ..	"	"	New Tariff ..	The Owharoa United Gold-mining Co. (N.L.).
18/2/96	25 2 0	Waitekauri ..	XIV.	Ohinemuri	New Waitekauri ..	Star of Waitekauri Gold-mining Co. (N.L.).
8/8/96	66 3 9	Waihi ..	XV.	"	New Year ..	Waihi South Gold-mining Co. (N.L.).
14/9/96	82 1 0	Waitekauri ..	XIV.	"	New Zealander ..	New Zealand Gold-mining Co. (N.L.).
24/8/96	82 1 4	Waihi ..	XVI.	"	Ngapuhi ..	Waihi Eldorado Gold-mining Co. (N.L.).
24/10/96	96 2 16	" ..	XIII.	"	Nimmo ..	Henry Fletcher.
20/5/97	11 2 23	Owharoa ..	II.	Aroha ..	Noonday ..	William Charles Kennedy.
14/9/96	45 0 0	Waitekauri ..	VI., XX.	Ohinemuri	North Waitekauri	William Horne.
24/10/96	97 0 0	Wharekirau-punga	VII.	"	Nova Scotia ..	John Murdoch Ross.
19/9/95	100 0 0	Komata ..	X.	"	Oceania ..	Oceania Gold-mining Co. (N.L.).
9/9/97	100 0 0	Waihi ..	I., II.	Waihi North	Ocean Beach ..	Waihi Beach Gold-mining Co. (N.L.).
9/9/97	99 0 0	" ..	"	"	Ocean Beach Ext.	"
10/12/95	100 0 0	Owharoa ..	XVI.	Ohinemuri	Ohinemuri ..	Ohinemuri Gold-mining Co. (N.L.).
31/5/97	76 0 0	Whangamata	VII.	"	O.H.M.S. ..	John William Darron.
19/5/96	30 0 0	Waitekauri ..	X.	"	Ohinemuri Star ..	John W. Ryan.
27/2/96	34 8 0	Waihi ..	XV., XVI.	"	Ophir ..	Waihi Gold-mining Co. (N.L.).
3/12/96	80 0 0	Karangahake	II.	Aroha ..	Orient ..	Orient Gold-mining Co. (N.L.).
24/8/95	90 0 0	Owharoa ..	"	"	Owharoa ..	The Ohinemuri Syndicate (Ltd.).
18/11/96	100 0 0	Maratoto ..	X.	Ohinemuri	Pakirarahi ..	Hikutaia Gold Syndicate (Ltd.).
28/12/96	100 0 0	" ..	"	"	"	Edwin G. Banks.
21/1/96	16 1 0	" ..	"	"	Ext. ..	Hikutaia Gold Syndicate (Ltd.).
25/6/96	99 8 10	Karangahake	II.	Aroha ..	Pandora ..	Pandora Gold-mining Co. (N.L.).
2/9/96	100 0 0	" ..	"	"	Pandora Extended	"
28/12/96	72 2 15	Wharekirau-punga	VII.	Ohinemuri	Parnassus ..	Auckland Prospecting Association (Ltd.).
6/8/96	80 0 0	Maratoto ..	VI.	"	Pay Rock ..	Hikutaia Gold Syndicate (Ltd.).
27/9/97	79 1 8	Waitekauri ..	X., XIV.	"	Pearl ..	Robert C. Speer.
30/6/96	4 0 11	" ..	XIV.	"	Perseverance ..	The Waitekauri United Gold-mining Co. (Ltd.).
10/6/97	2 8 0	" ..	X.	"	Pilot Extended ..	Waitekauri Union Claims.
31/12/95	100 0 0	" ..	"	"	Pilot ..	Waitekauri Union Claims (Ltd.).
5/9/96	15 0 0	" ..	"	"	Portsea ..	Portsea Gold-mining Co. (Ltd.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
9/2/97	A. B. P. 17 0 0	Waihi ..	XVI.	Ohinemuri	Prince of Waihi Extended	Arthur Edward Langley.
2/9/96	100 0 0	Wharekirau-punga	VII.	"	Prince of Wales ..	Prince of Wales Gold-mining Co. (N.L.).
3/6/96	100 0 0	Waitekauri ..	VI., X.	"	Queen Anne of Waitekauri	The Queen Anne Gold-mining Co. (N.L.).
8/8/96	76 1 8	Komata ..	X.	"	Queen Anne Ext.	Annie Sergeant.
23/12/96	100 0 0	Maratoto ..	VI., X.	"	Queen of Maratoto	William H. Cooper.
4/10/95	67 3 37	Komata ..	X.	"	Rainbow ..	Alfred Kidd.
3/5/95	90 0 0	Karangahake	{ XIII. I.	Aroha }	Ravenswood ..	Woodstock Main Reef (Ltd.).
24/3/96	97 2 6	Owharoa ..	XIV.	Ohinemuri	Remuera ..	Ohinemuri Syndicate (Ltd.).
19/9/96	100 0 0	Waihi ..	II.	Waihi North	Rhodes ..	Charles W. Cave.
23/12/96	58 1 21	Waitekauri ..	XIV.	Ohinemuri	Rising Sun	Rising Sun Gold-mining Co. (N.L.).
31/12/95	100 0 0	Waihi ..	XVI.	"	Rosemont	Union Waihi Gold-mining Co. (Ltd.).
3/6/96	100 0 0	Karangahake	I.	Aroha ..	Rothschild	Rothschild Gold-mining Co. (N.L.).
23/12/96	86 3 3	"	"	"	Rotokohu	Edward Ryan.
14/9/96	99 0 0	Waitekauri ..	XIV.	Ohinemuri	Royal Arms	The Devon Gold-mining Co. (N.L.).
13/1/97	100 0 0	Komata ..	IX., X.	"	Royal Mail	Charles F. Wrigley and D. Allen.
10/11/96	12 0 0	Wharekirau-punga	VII.	"	Royal Shield	The Royal Shield Gold-mining Co. (N.L.).
7/4/96	100 0 0	Ditto ..	"	"	Royal Standard ..	John Guest Ralph.
25/3/96	100 0 0	"	"	"	Royal Standard Extended	Thomas D'Arcy O'Toole.
22/10/95	26 0 0	Karangahake	I.	Aroha ..	Ruby ..	Joseph Barber.
14/5/97	100 0 0	Te Aroha ..	VI.	"	Rotorua Lake	Malika Keepa.
16/11/97	92 0 0	Whangamata	III.	Ohinemuri	Royal Reefs	John Mason Sharp.
16/11/97	89 0 0	"	"	"	Royal Reefs Ext.	"
23/7/96	100 0 0	Wharekirau-punga	VII.	"	Sceptre ..	Auckland Prospecting Association (Ltd.).
19/2/97	96 3 8	Waitekauri ..	XIV.	"	Sootia ..	John Henry Porter.
25/3/96	76 2 10	Te Aroha ..	X.	Aroha ..	Silver Star	Edwin C. Martin.
25/6/96	82 2 38	Waihi ..	XVI.	Ohinemuri	Silverton	Waihi-Silverton Extended Gold-mining Co. (Ltd.).
23/12/96	91 1 7	"	"	"	Silverton No. 2	Ditto.
3/9/96	64 0 27	"	XV.	"	Sink to Rise	Edward Mann Corbett.
8/5/96	99 2 6	Waitekauri ..	X.	"	Socket ..	Waitekauri Gold-mining Co. (Ltd.).
13/9/95	62 2 5	"	XIV.	"	Sophia ..	British Empire Gold-mining Co. (N.L.).
23/7/95	30 0 0	Karangahake	II.	Aroha ..	South British	South British Gold-mining Co. (N.L.).
31/3/96	30 0 0	Komata ..	X.	Ohinemuri	Southern Cross	Southern Cross Gold-mining Co. (N.L.).
17/2/96	61 2 37	Karangahake	I.	Aroha ..	Stanley ..	Stanley Gold-mining Co. (N.L.).
23/7/96	91 3 32	"	II.	"	Sterling ..	Sterling Gold-mining Co. (N.L.).
3/6/96	90 1 36	Maratoto ..	VI., VII.	Ohinemuri	Takapuna	Robert Wynyard.
3/9/96	60 0 0	Karangahake	I.	Aroha ..	Talisman	New Zealand Talisman Gold-mining Co. (Ltd.).
29/6/96	79 2 15	"	"	"	Talisman Extended	Talisman Extended Gold-mining Co. (Ltd.).
30/11/96	77 2 19	Wharekirau-punga	VII.	Ohinemuri	Tavistock Central	Henry Hughes.
14/11/95	97 3 36	Komata ..	X.	"	Te Ao Marama	Waitekauri Gold-mining Co. (Ltd.).
3/9/96	100 0 0	Waitekauri ..	XIV.	"	Te Awamutu	Isaac Jones and others.
23/7/97	100 0 0	Karangahake	I., II.	Aroha ..	Tenilba ..	Deep Lead Gold-mining Co. (N.L.).
13/1/97	99 0 15	Waitekauri ..	XIV.	Ohinemuri	Teutonic Amalgamated	Teutonic Gold-mining Co. (N.L.).
8/6/96	73 3 4	Owharoa ..	XIV.	"	Thorpe ..	The Ohinemuri Syndicate (Ltd.).
27/8/97	30 0 0	Waihi ..	XVI.	"	Three Cheers	William L. Hunter.
27/10/96	2 3 13	Waitawheta	VI.	Aroha ..	Tit Bit ..	Edwin Charles Martin.
25/4/96	100 0 0	Maratoto ..	"	Ohinemuri	Tomoana	William Horne.
29/11/97	100 0 0	Waitekauri ..	XIV.	"	Torpedo ..	Waitekauri No. 2 Gold-mining Co. (N.L.).
17/10/95	100 0 0	Komata ..	X.	"	Triumph	Komata Triumph Gold-mining Co. (N.L.).
25/4/96	51 2 8	"	"	"	Triumph Extended	Ditto.
14/6/97	100 0 0	Waihi ..	III.	Waihi North	Truro ..	William Tregoweth.
27/9/95	27 1 24	Owharoa ..	XIV.	Ohinemuri	Tunnel ..	Ohinemuri Syndicate (Ltd.).
14/2/98	100 0 0	Maratoto ..	X.	"	Tunnel ..	Waitekauri Gold-mining Co. (Ltd.).
21/5/95	14 1 36	Waitekauri ..	VI.	"	Two- and - Two-makes-Four	Waitekauri Central Gold-mining Co. (Ltd.).
81/12/95	100 0 0	Waihi ..	XVI.	Aroha ..	Union ..	Union Waihi Gold-mining Co. (Ltd.).
81/5/97	97 3 20	Karangahake	I., V.	"	Victory ..	Charles David Wright.
11/5/96	99 1 10	"	I.	Ohinemuri	Victor Waihou	Victor Waihou Gold-mining Co.
1/2/96	100 0 0	Waihi ..	XVI.	"	Waihi Eldorado	The Waihi Eldorado Gold-mining Co. (N.L.).
14/8/95	100 0 0	"	"	"	Waihi Extended	Waihi Extended Gold-mining Co. (Ltd.).
1/3/97	66 2 8	"	"	"	Waihi Gladstone	Waihi Gladstone Gold-mining Co. (Ltd.).
10/12/95	91 2 0	"	II.	Waihi North	Waihi Monument	Waihi Monument Gold-mining Co. (N.L.).
1/2/96	100 0 0	"	VII.	Ohinemuri	Waihi Monument Extended	Ditto.
13/11/95	98 1 0	"	XV., XVI.	"	Waihi North	Waihi Consols Gold-mining Co.
8/10/95	14 0 16	"	XV.	"	Waihi South	Star of Waihi Gold-mining Co. (N.L.).
28/8/96	90 0 0	"	"	"	Waihi West	Waihi Grand Junction Gold-mining Co. (Ltd.).
9/9/97	97 1 16	"	I., II.	Waihi North	Waihi Beach	Waihi Beach Gold-mining Co. (N.L.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued*.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. B. P.					
26/8/97	6 2 30	Waihi ..	III.	Waihi North	Waihi Beach No. 1	Frederick Moore.
26/8/97	16 2 30	" ..	"	"	Waihi Beach No. 2	E. B. Grey.
29/11/97	87 3 3	" ..	"	"	Waihi Beach No. 3	John Hanna Grey.
29/11/97	100 0 0	" ..	IV.	"	Waihi Beach No. 4	Charles E. McCormick.
29/11/97	77 1 8	" ..	III.	"	Waihi Beach No. 5	David Sheehan Grey.
29/11/97	96 2 0	" ..	"	"	Waihi Beach No. 6	Arthur Frank Moginie.
29/11/97	82 0 24	" ..	"	"	Waihi Beach No. 8	Ernest B. Dufaur.
29/11/97	92 0 25	" ..	"	"	Waihi Beach No. 9	Sydney Codicutt.
26/8/97	6 2 28	" ..	"	"	Waihi Beach No. 11	John Soarlet.
3/2/98	95 0 0	" ..	"	"	Waihi Beach No. 12	John Rowley Miller Stewart.
7/8/97	56 0 0	" ..	"	"	Waihi Foreshore ..	George Carrick and James W. Shaw.
14/5/97	68 2 7	" ..	II.	"	Waihi North Ext.	Peter MacFarlane.
3/5/97	96 0 0	" ..	"	"	Waihi North No. 1	Henry Fletcher.
31/5/97	99 0 0	" ..	XV.	Ohinemuri	Waihi South Ext.	John Prescott.
31/5/97	91 0 0	Whangamata	VII.	"	Waipaheke ..	George Sievwright.
20/9/88	9 2 23	Waitekauri ..	XIV.	"	Waitekauri ..	Waitekauri Gold-mining Co. (Ltd.).
3/3/96	28 3 36	" ..	X.	"	Waitekauri Central No. 1	Waitekauri Junction Gold-mining Co. (N.L.).
23/7/96	100 0 0	" ..	VI., VII.	"	Waitekauri Consols	Thomas Henderson.
27/10/96	10 1 0	" ..	XXV.	"	"	Mangakara United Gold-mining Co. (N.L.).
17/8/95	100 0 0	" ..	VI., VII., X., XI.	"	Waitekauri Cross	Waitekauri Cross Gold-mining Co. (Ltd.).
23/3/96	95 2 19	" ..	VI.	"	Waitekauri Ext. ..	Waitekauri Extended Gold-mining Co. (Ltd.).
18/2/96	80 0 0	" ..	XIV.	"	"	Waitekauri South Gold-mining Co. (N.L.).
18/2/96	30 0 0	" ..	"	"	Waitekauri Golden Gem	James Henry Porter.
21/10/97	80 0 0	" ..	XIV.	"	Waitekauri Grand Junction	George Thomas Weston.
19/6/95	100 0 0	" ..	X., XIV.	"	Waitekauri Jubilee Extended	The New Zealand Jubilee Gold-mines (Ltd.).
5/5/96	30 0 0	" ..	XIV.	"	Waitekauri Junction	John Guest Ralph.
27/9/97	38 1 16	" ..	X.	"	Waitekauri Junction	Waitekauri Junction Gold-mining Co. (N.L.).
26/8/96	30 0 0	" ..	XIV.	"	Waitekauri Junction Extended	Joseph T. Armitage.
20/8/96	32 0 0	" ..	X.	"	Waitekauri Kathleen	Nathan Alfred Nathan.
17/2/96	40 0 0	" ..	XIV.	"	Waitekauri King..	Waitekauri King Gold-mining Co. (N.L.).
17/2/96	100 0 0	" ..	XI.	"	Waitekauri Monarch	Waitekauri Monarch Gold-mining Co.
31/5/97	85 2 38	" ..	VIII., IX.	"	Waitekauri Monument	Thomas Graham.
14/9/96	100 0 0	" ..	X.	"	Waitekauri Queen	Waitekauri Queen Gold-mining Co. (N.L.).
19/2/97	41 1 26	" ..	XI.	"	Waitekauri Reefs Extended	William McCormick.
27/9/97	99 0 0	" ..	XIV.	"	Waitekauri United	Waitekauri United Gold-mining Co. (Ltd.).
27/8/97	10 2 24	" ..	"	"	Waitekauri United No. 2	Waitekauri United Gold-mining Co. (Ltd.).
27/2/96	100 0 0	" ..	VI., X.	"	Waitekauri West Cross	William Horne.
17/2/96	100 0 0	Waihi ..	XVI.	"	Waitete ..	Henry Gilfillan, jun.
25/6/96	100 0 0	" ..	"	"	Waitete Extended	"
19/6/95	100 0 0	" ..	"	"	Waka ..	Grand Junction Gold-mining Co. (Ltd.).
19/9/96	80 2 2	Maratoto ..	VI.	"	Walker's Maratoto	John Watson Walker.
30/11/96	46 0 0	Waihi ..	XVI.	"	Watchman ..	William H. Ohurton.
13/11/95	63 2 35	Karangahake	I.	Aroha ..	Waverley ..	Waverley Gold-mining Co. (N.L.).
3/6/96	85 0 29	"	I., II.	Ohinemuri	Wealth of Nations	Wealth of Nations Gold-mining Co. (N.L.).
27/2/96	100 0 0	Waitekauri ..	VI., X.	"	West Waitekauri	William Horne.
11/12/94	15 0 0	"	X.	"	We Three ..	Alpha Gold-mining Co. (N.L.).
11/5/96	100 0 0	Wharekirapunga	VII.	"	Wharekirapunga	Royal Shield Gold-mining Co. (N.L.).
3/6/96	100 0 0	Maratoto ..	VI.	"	Winn ..	Wilfrid Rathbone.
18/1/94	72 1 18	Karangahake	I.	Aroha ..	Woodstock United	Woodstock Gold-mining Co. (Ltd.).
24/3/96	100 0 0	Owharoa ..	XIV.	Ohinemuri	Wright ..	Ohinemuri Syndicate.
17/4/94	14 3 12	Waitekauri ..	"	"	Young New Zealand	The New Zealand Gold-mining Co. (N.L.).
14/5/97	100 0 0	" ..	XV.	"	Zephyr ..	William Henry Potter.
14/5/97	100 0 0	" ..	"	"	Zephyr Extended	William John Downie.
13/11/95	72 2 0	" ..	XIV.	"	Zion ..	Zion Gold-mining Co. (N.L.).

*Maratoto District.*

*Hikutaita Gold Syndicate's Mine* (Area, 350 acres).—The mine has been well opened up. The reef, which varies in thickness from 6 ft. to 14 ft., has been driven on at No. 5 level 1,250 ft. and 600 ft. at the bottom level. Winzes have been sunk from one level to another, giving good ventilation. Prospecting has been done at the surface levels, and the ore, though of low grade, is considered payable. A considerable quantity of quartz is now in sight. Thirteen men are employed.

*Walker's Maratoto Mine* (Area, 80 acres 2 roods 2 perches).—Prospecting has been energetically carried on in this property, but the results have not been sufficiently good to justify the erection of a battery. From five to sixteen men were employed.

In the Volunteer, Lord Salisbury, Retreat, and several other claims in the district prospecting operations have been suspended.

*Komata District.*

*Komata Reefs Mine* (Area, 79 acres).—This has lately been joined with the Komata Queen Mine, with an area of 130 acres, making a total area of 209 acres. The owners are the Komata Reefs Gold-mines (Limited). A considerable amount of development work was carried on in the Komata Reefs section. There are three levels opened—No. 1, 60 ft.; No. 2, 140 ft.; and No. 3, 240 ft., below the surface. Argall's reef, the main ore-producer, has an average width of from 3 ft. to 4 ft., and is composed of loose friable quartz containing a large quantity of manganese-oxide. The vein stuff is well oxidized on the levels at present opened, there being very little iron-pyrites through the quartz. Hartridge leader is a small vein varying from 6 in. to 8 in. in width, carrying high-grade ore. The quartz is similar in character to that of Argall's reef, only harder and more compact. Lavington reef is a large low-grade reef about 20 ft. wide, the quartz being similar in appearance to that of the Argall reef; very little work, so far, has been done on this reef. The nature of development work carried out during the year consists of driving cross-cut, No. 3 level, and driving along the strike of the various reefs on the different levels, and rising and sinking to make connections. The chief work has been on Argall reef, and consists of—No. 1 level, driving north 80 ft., south 40 ft.; No. 2 level, driving north 428 ft., south 150 ft.; No. 3 level, driving north 260 ft., south 160 ft. The total amount of work done in the mine is—Rising and sinking, 720 ft.; cross-cutting, 1,450 ft.; driving on reefs, 1,500 ft.

Mine machinery: One small ventilating-fan, driven by small Pelton wheel. Mill machinery: Steam-engines—One small semi-portable engine used as auxiliary power for driving the stamp battery. Water-wheels—One 6 ft. Pelton wheel for main motive-power, and one 3 ft. Pelton wheel for driving vacuum pumps, berdan, and dynamo for electric light. Stamps—One battery of twenty head, square frame, with horizontal driving-belts; weight of stamps, 700 lb.; five stamps working in each mortar-box and a Challenge ore-feeder to each box. (The battery was erected for dry-crushing but has recently been changed to the wet process.) Rock-breakers—One Gates No. 2, style D. Berdans—One, used for blanketing. Concentrators—Blanket strakes. Ore-drying furnaces—One rotary furnace. Cyanide-vats—Twelve circular vats, 22 ft. diameter, 4 ft. sides, made of steel, and each supplied with a revolving distributor for spreading the tailings from the battery evenly. Zinc-boxes—Two, with twelve compartments in each. The capital expended on mill machinery is £9,216 10s.

The process employed up to February, 1898, was dry-crushing and cyanide leaching, the tailings from the vats being run over amalgamated copper-plates and blankets, there being a fair quantity of coarse gold in the ore. The process at present in use is wet-crushing, amalgamation on copper-plates, and leaching of the tailings by cyanide solution. About 70 per cent. of the total gold is obtained as amalgam on the plates in front of the battery, and a further 75 per cent. is extracted from the tailings by cyanide. The *modus operandi* is as follows: The tailings from the plates are run through a revolving distributor (this revolves automatically by the flow of the tailings from its curved pipes), and evenly spread in the vat. The excess of water, charged with fine slime, discharges into a circular launder placed around the inside of the vat, from which it runs into a tank, to be pumped back to a tank above the battery, and reused as battery water. The percolation by this method is good and comparatively easy, the percentage of extraction being very fair.

Length and capacity of water-races: Main race, two miles long; capacity, four sluice-heads. Besides the main race there is half a mile of branch race. The capital expended on water-races is £1,460 13s. 4d. Aërial tram-line: 44 chains in length, of the single-rope system, carrying thirty-three buckets of 150 lb. capacity each, worked by gravitation, assisted by a 3 ft. Pelton wheel, using the water from the mine. The ground tramway is one mile in length, operated by a small locomotive. The capital expended on tramway construction is £4,818 5s.; and on road-making, £385 18s. Milling operations, &c.: Average quantity of quartz crushed per stamp daily, 16 cwt.; average number of stamps employed daily, 17; number of days during the year on which the mill was worked, 177; total quantity of quartz crushed, 2,375 tons, of 2,240 lb. each; total yield of bullion, 12,303 oz., value £9,532 12s. 2d.; total bullion recovered by cyanide process—Gold, 1,759·85 oz.; silver, 8,864·5 oz.; total value, £8,486 2s. 2d. Total bullion recovered by amalgamation—Gold, 249·57 oz.; silver, 142·78 oz.; total value, £1,046 10s. Total value of bullion for owners, £9,532 12s. 2d.; cost of mining per ton, 19s. 9d.; cost of carriage per ton, 1s. 10d.; cost of milling and treatment, £1 0s. 4d. Average number of men employed during the year: Mine, forty-eight, on wages and contract; tramway construction, forty, for six months; erection of and running of battery, twenty-six during the year.

The following account applies to the work carried on in the Komata Queen section previous to amalgamation:—Top level: Average depth below surface, 50 ft. Lavington reef driven on a distance of 100 ft. in a northerly direction. This is a very large reef, containing low-grade quartz. Smithy level: Average depth below surface, 250 ft. Lavington reef driven on a distance of 281 ft. in a northerly direction. The reef is very wide in places, and carries a soft friable quartz. Argall reef: Driven on a distance of 286 ft. The reef shows small, and pinched, with small patches of

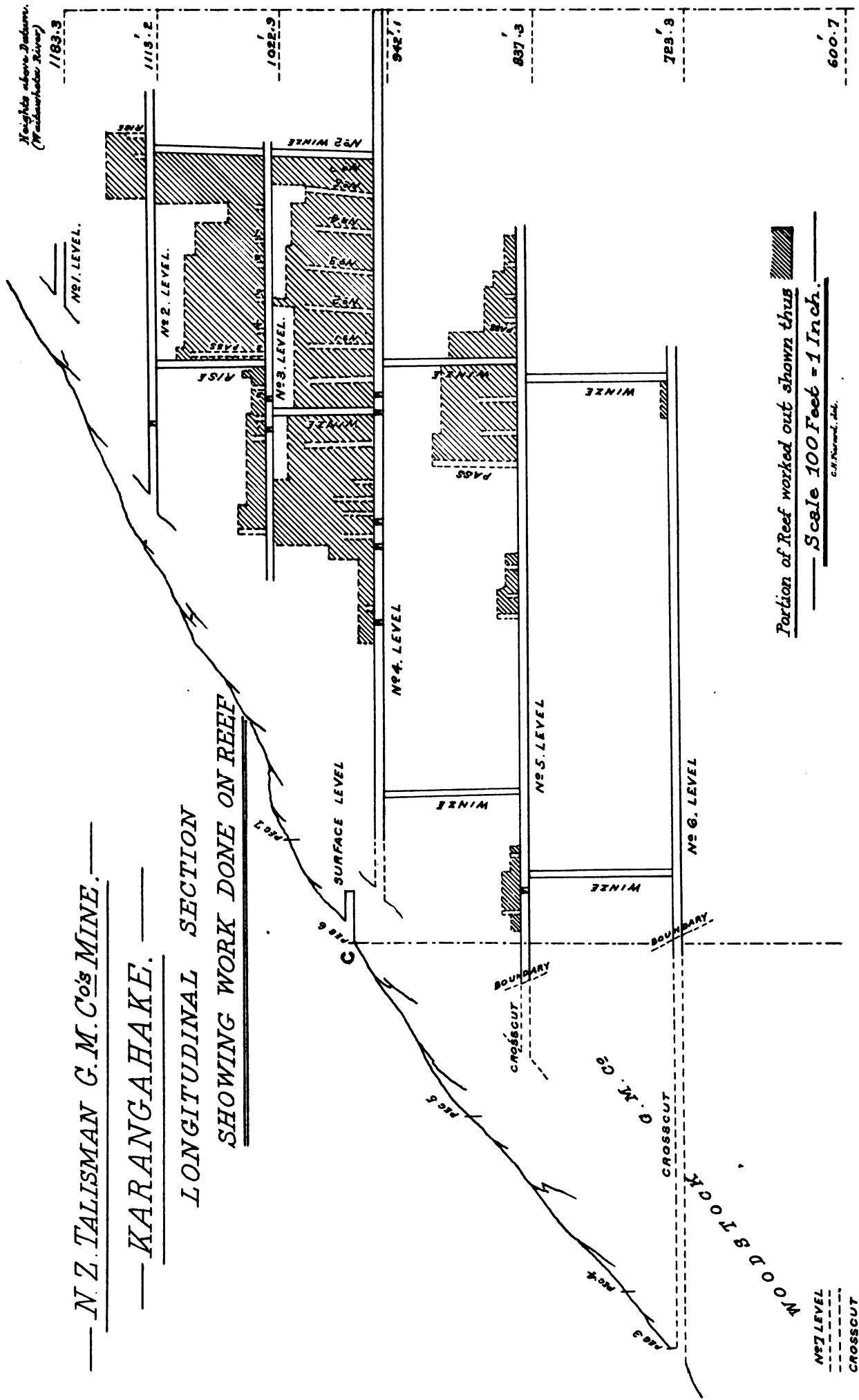
*New Zealand Talisman Mine* (New Zealand Talisman Gold-mining Company, Limited, owners).—The land occupied consists of a special claim of 60 acres, a machine-site on which the crushing plant is erected, and a special site on which a building has been erected containing a number of the vats used for the cyanide process. The reef, which hitherto has yielded the chief gold-producing quartz, has been well developed; six different levels have been driven, and communication effected by winzes and uprisings, which open up the various blocks of reef between No. 6 level and No. 1 level, and a fresh adit is being driven 120 ft. below No. 6. The situation of the claim is most favourable for economical working, the precipitous character of the country affording the opportunity of working from the surface by a succession of adit levels. The No. 7 level, which is the deepest, is 120 ft. below No. 6, the height of the others being—from No. 6 to No. 5, 115 ft.; No. 5 to No. 4, 104 ft.; No. 4 to No. 3, 80 ft.; No. 3 to No. 2, 290 ft.; No. 2 to No. 1, 70 ft.; and the average depth of the No. 1 level is 215 ft. from the surface. The height of No. 7 level above the level of Waitawheta Stream is about 600 ft., and there is therefore a total height of nearly 1,400 ft. from datum to the surface above No. 1 level. The reef, which averages 3 ft. 6 in. in width, consists of quartz having a wavy appearance, flinty and crystalline in character, and of a hard nature. Considerable difficulty was at first experienced in obtaining a satisfactory extraction of the gold contained. There is every indication of the reef extending downwards, and this will shortly be proved as far as No. 7 level is concerned. The entrance to No. 7 is in the Woodstock Company's ground, and 750 ft. must be driven before the boundary of the Talisman is reached; this, it is anticipated, will take 200 ft. further driving to complete. The quartz is conveyed from the mine to the battery by a wire tramway across the Waitawheta Gorge. At the mill a new revolving ore-drying furnace, capable of drying 40 tons per day, has been erected, and is now used in place of the kilns. The crushing plant consists of two stone-breakers, twenty head of stamps, and a No. 5 Krupp ball-mill, and six berdans and amalgamating-tables. The cyanide plant includes fourteen vats, twelve 22 ft. and two 18 ft. in diameter, with vacuum pumps, zinc filters, &c. The motive-power for the machinery is furnished by two Victor turbines of the respective diameters of 21 in. and 12 in., the latter being used for driving a dynamo for lighting and power purposes. The water is conveyed from the Waitawheta Stream through a tunnel 95 ft. in length, connecting with a wrought-iron pipe 4 ft. in diameter and 925 ft. in length, and delivered into the concrete-walled turbine-pit, 28 ft. in depth. In the building on the special site water necessary for sluicing out the vats is conveyed in a 3 in. pipe from the Hauraki Creek, and the power for the pumps is transmitted to the electric motor from the dynamo at the machine-site, which also produces electric light for both plants. During the year 4,194 tons of quartz was crushed and treated for a yield of gold valued at £13,681 7s. 3d. Seventy-five men were employed in the mine and at the mill.

To face page 68, C-3.]



— N. Z. TALISMAN G. M. CO'S MINE. —  
 — KARANGAHAKE. —

LONGITUDINAL SECTION  
 SHOWING WORK DONE ON REEF







quartz. Cross-cut to east driven 450 ft., and cuts several reefs, none of which have yet been driven on. Level 50 ft. below Smithy level: A cross-cut has been driven east 206 ft. Level 130 ft. below Smithy level: A cross-cut has been driven east 386 ft. There is no machinery in connection with this mine. The average number of men employed during the eight months previous to amalgamation with the Komata Reefs Company was fifteen.

*Woodstock Mine* (Area, 72 acres 1 rood 18 perches).—Since last annual report 1,974 fathoms of stoping have been done on the Maria lode, and the development work carried out may be summarised as follows: Driving on the lode, 2,379 ft.; rising on the lode, 601 ft.; sinking on the lode, 190 ft. The mine is opened up by six different levels, and the total lengths of same are as follows: No. 1 level, 693 ft.; intermediate level, 798 ft.; No. 2 level, 826 ft.; No. 3 level, 1,036 ft.; No. 4 level, 989 ft.; No. 5 level, 831 ft. These levels have all been connected one with the other, partly by rising and partly by sinking, and the whole of the mine-workings are now splendidly ventilated. The No. 5 is the lowest level obtainable, bar sinking, and the backs available range from 80 ft. on the left-hand bank of the Waitawheta River to 900 ft. at the southern boundary, which is the highest point in the property. A cross-cut 500 ft. in length has been driven west of No. 5 level, and several gold- and silver-bearing lodes have been intersected during its progress. Within the next 20 ft. of driving the Woodstock lode should be met with, and upon this the cross-cut will afford 360 ft. of backs beneath the old workings. The total amount of cross-cutting accomplished throughout the mine is 1,860 ft., and this work has revealed numerous veins and lodes, varying in size and value, and running west of and parallel with the Maria lode. The total quantity of ore treated from all parts of the workings on the Maria lode during the year ending the 31st March, 1898, was 10,923 tons, for a bullion return of 50,400·27 oz.; value, £35,955 1s. Of this, the bullion recovered by the cyanide process amounted to £32,899 11s. 9d., and the value redeemed by amalgamation was £3,055 9s. 3d. Owing to its refractory character, considerable difficulty has always been experienced in the treatment of Woodstock ore, and many processes have been tried with varying success. Dry-crushing with subsequent cyanide treatment, followed up by concentration and amalgamation, gave the best results, but even then the extraction was comparatively low, and the consumption of cyanide made milling operations costly. Early in the present year a start was made to crush wet with a dilute solution of cyanide in the mortar-boxes, as an experiment, and the bullion results were so highly satisfactory that it was decided to adopt wet-crushing. Dry-crushing was then stopped, and wet-crushing started, with twenty head of stampers. For some unaccountable reason the high bullion extraction obtained from the experimental wet-crushing was not borne out by subsequent results with the same treatment on a large scale, and experiments are now being made with a view to ascertaining the cause. Mr. H. H. Adams, who has successfully established a new departure in the treatment of ore by wet-crushing at the Komata Reefs mill, is now trying the same process in the Woodstock mill, and, so far as operations have gone, it looks as if his expectations would be realised. An average of 174 men were employed.

*Crown Mine* (Area, 135 acres 1 rood 31 perches; owners, the New Zealand Crown Mines Company, Limited).—This mine is situated on the Waitawheta River, distant about a mile from the battery and works, which are built on the left bank of the Ohinemuri River, a short distance below the Township of Karangahake. The workings are very extensive, the levels reaching from the Waitawheta River to a point past the trig. station, which is about 1,600 ft. above the level of the adit. The average height of the available backs would thus be about 800 ft., and the reefs will produce great quantities of ore from the portion of the mine opened from the adit, irrespective of the downward extension of the reefs, which, so far as already prospected, are of a highly valuable character. The general manager, Mr. R. H. Daw, has furnished the following account of the operations during the year ended 31st March last:—

"Mining has been confined exclusively, for the year above-mentioned, to the Crown Mines section of the property, and the Welcome Reef south of the Waitawheta River has produced all the quartz milled during that period. The supplies have been drawn principally from the stopes over Nos. 3, 4, and 6 adit levels (the latter being the main level through which the quartz is delivered in the Waitawheta Gorge, its mouth being about 10 ft. above the normal level of the river), the balance of ore having come from the underhand stope in the floor of this level, and in comparatively small quantities from other workings under river-level. Little, however, has been done to develop the resources below river-level pending the further sinking of the main incline shaft, now being pushed down with all possible speed, in order to attack systematically the excellent quartz proved to exist in this section of the property." The main features in the development for the year consist in the extension southwards on the course of the Welcome Reef of Nos. 4 and 6 adit levels, in the putting up of two main rises from No. 4 level to Coward's No. 3 level (old workings), and in the setting-off, stripping, and timbering the main incline shaft now being sunk on the underlie of the reef 100 ft. in from the mouth of No. 6 level. Since my last report, No. 4 level has been extended 630 ft., making its total length 2,300 ft., and No. 6 level has been driven a further distance of 540 ft., to a total length from its mouth of 2,200 ft. During the year the reef has, generally speaking, maintained its average thickness and value, the whole of the quartz mined from the main levels having been sent to the mill. The two main rises previously mentioned have been completed to Coward's No. 3 level, a total height of about 480 ft., opening up in their course immense blocks of low-grade ore for stoping, besides proving thoroughly efficient in ventilating the main workings below. With the completion of the Upper Waitawheta Water-race, the erection of the air-compressor, and winding-engines, we have been enabled to continue the sinking of the main incline shaft. This shaft measures 29 ft. by 6 ft., inside timbers, and has now reached the No. 7 level, a depth of 60 ft. on the underlie of the reef. When a further depth of 60 ft. has been reached, No. 8 level will be put out from the shaft north and south, and stoping actively commenced. The winding-gear is now complete with double line of rails, incline, cages, &c. For the year, 17,960 tons of ore were mined and sent to the mill. Milling has been carried on continuously during the year with forty heads of stamps. From April to August

last these were gradually converted from dry to wet crushing, with a gratifying increase in the quantities milled and in bullion produced. The following are the quantities of ore milled and value of bullion recovered :—

—				Tons.	Value.	Remarks.
1897.					£	
April	...	...	...	1,180	3,106	Forty heads crushing, dry.
May	...	...	...	1,301	3,567	Gradual conversion from dry to wet crushing.
June	...	...	...	1,202	3,296	
July	...	...	...	1,473	4,081	
August	...	...	...	1,567	4,163	
September	...	...	...	1,788	4,069	All wet.
October	...	...	...	1,964	4,232	
November	...	...	...	2,034	4,443	
December	...	...	...	1,490	3,220	Three weeks.
1898.						
January	...	...	...	1,480	3,041	Three weeks.
February	...	...	...	1,511	3,985	
March	...	...	...	1,764	3,976	
				18,755	45,179	

The wet-crushing adopted is a system of crushing with a full-strength solution of cyanide of potassium supplied to the mortar-boxes. The details of the process have not yet been made public. The fall in quantity of ore crushed since January is due to the closing of the mills on Sundays. New Mill: Foundations and mortar-blocks have been laid down for another forty heads of stamps, twenty of which are in course of erection, and are expected to be at work in July, the necessary cyanide plant in conjunction with same having been completed. The stamps are 1,000 lb. each, single discharge boxes, and were supplied by Messrs. Fraser and Chalmers, Limited, London. The average number of men employed up to December was 240, and for this year 188."

*Talisman Extended Mine* (Area, 72 acres 2 roods 15 perches).—The chief work carried on during the year was driving on the low level to intersect the Talisman reef. This drive is in a distance of 780 ft. Surface prospecting has also been done, but as yet nothing payable has been discovered. Four men were employed.

*Imperial Mine* (Area, 60 acres).—At Nos. 1 and 2 levels a large amount of work has been done, and the low level has recently been started to cut the reef. Five men are employed.

*Woodstock Main Reefs*.—No. 6 level has been driven a distance of 628 ft. The reef varies from 8 ft. to 14 ft. in width, the quartz there being of a low grade. The No. 3 Ivanhoe has been driven 600 ft., but nothing payable has been discovered, and the company have ceased operations.

In the Stanley, Stirling, Waverley, Golden Fleece, St. Patrick, and Crown Imperial Mines extensive prospecting has been carried out, but, in consequence of the failure to discover payable stone, most of them have been recently under protection.

#### Owharoa District.

*Ohinemuri Syndicate* (Area, 700 acres).—The pumping and winding machinery has been erected in this company's shaft between the road and the river. A shaft 12 ft. by 6 ft. has been sunk a depth of 143 ft. At 120 ft. a chamber has been opened out, from which cross-cut drives are being put in, that to the north being in 100 ft., and that to the north-west 115 ft. It is expected that the Radical reef may be cut at any time. Twenty-one men are employed.

#### Waihi District.

*Waihi Mine* (Area, 346 acres; owners, Waihi Gold- and Silver-mining Company).—Extensive operations have been carried on during the year, principally driving and stoping in the Martha, Welcome, and Victoria lodes, the supply of quartz being ample to keep the mill constantly at work. The stone from the Martha lode over No. 2 level is of good quality. From the Victoria lode, on No. 2 level, the ore is of medium quality, the width of the lode being 6 ft. From the Welcome lode, which is 14 ft. in thickness on No. 2 level, the stone is of good quality. On No. 1 level of the Welcome lode, at the western end, the quality of the quartz is improved, the lode being 5 ft. in thickness. The cross-cut has been started from the south-eastern side of the level to connect with No. 3 shaft. The Surprise lode, on No. 1 level, has been driven on a distance of 132 ft. No. 3 shaft has attained a depth of 100 ft. below the surface. A number of small lodes have been cut through while sinking this shaft, varying from 15 in. to 2 ft. in width, all containing a fair percentage of gold. The Victoria battery, at Waikino, recently commenced crushing, fifty stamps being employed. 37,164 tons of quartz has been treated, for a yield of 126,801 oz. of bullion; value, £143,533. There are five hundred men employed by the company, 310 being engaged in the mine and the others employed at the batteries and on surface-works.

*Union Mine* (Area, 250 acres).—Operations in this mine have chiefly been confined to development works. The main shaft, 14 ft. by 6 ft., has been sunk to a depth of 300 ft., and three levels have been opened out, entailing a large amount of work in driving on the Union reef, which varies from 3 ft. to 6 ft. in width. A large amount of work has also been done on the Amaranth reef, which varies in thickness from 12 ft. to 30 ft. In the Winner section of the mine a cross-cut has been made from the whim-shaft to intersect the Winner reef.

*Waihi-Silverton Mine* (Area, 174 acres).—Driving and stoping at Nos. 1 and 2 levels have been vigorously carried on, and the shaft sunk to a depth of 250 ft., where a chamber was opened out and a cross-cut driven to intersect the reef. Driving is now proceeding north and south, the reef being about 7 ft. in width. The ore, though of low grade, is payable. The shaft is also being sunk below No. 3 level, for the purpose of opening up another level as early as possible. The forty-stamp mill has been continuously employed, and 11,253 tons of quartz, yielding 8,456 oz., valued at £16,452, has been crushed. Seventy men are employed.

*Waihi Grand Junction Mine* (Area, 280 acres; owners, Waihi Grand Junction Gold Company, Limited).—Work was carried on in an energetic manner for a considerable part of the year. In consequence of financial difficulties, the old company was reconstructed, and sufficient capital is now available for the development of the mine. A difficulty of no small importance attends initiatory work to open a mine in this part of the district. The land is situated both to the eastward and southward of the celebrated Waihi Mine, but, unlike the Waihi Mine, where the Martha Hill rises to over 200 ft. above the level of the surrounding country, the land at both ends of this hill is covered to a more or less depth with a deposit of later volcanic matter in the form of hard rhyolite rock interspersed with clays, mud, and fragments of the harder rock overlaying the decomposed andesite or bed-rock. In this andesite rock the reefs exist. Therefore, until the overlying strata has been pierced, no exploration can be carried on in country favourable for the presence of quartz lodes. This company, however, succeeded during last year in sinking their shaft at the eastern end to a depth of 507 ft., the first 250 ft. being through the superimposed later volcanic ejecta. At a depth of 494 ft. chambers were formed and prospecting drives made both in a northerly and southerly direction, 167 ft. in the first and 199 ft. in the latter direction. At the western end the shaft, 170 ft. in depth, was opened, and a level driven northerly 601 ft., and in the opposite direction the drive at 430 ft. from the shaft intersected a large body of quartz identified with the Martha reef worked in the Waihi Mine. This drive was then further extended 350 ft., with a view of discovering the Welcome reef, also worked by the Waihi Company. Such was the extent of work done during the year 1896–97.

During the past year the north drive, at the low level in the eastern shaft, was extended to 411 ft. from the shaft. A large reef was here intersected, but, on account of the great flow of water attendant on the quartz being cut into, the pump in use was not sufficiently powerful to cope with it. It was then decided to stay operations until such time as more powerful pumping machinery was obtained, and, taking advantage of a hard bar of andesite, a dam built of cement 5 ft. in thickness was constructed, and the flow of water thereby controlled. It was found at this time that the water was lowered in the workings on the reefs in the Martha section of the Waihi Mine, and thus showing that the quartz cut, and from which there was such a flow of water in this mine, must be identical with the Waihi reefs line. In consequence of the advantage the Waihi Company received from the drainage effected by the use of the Grand Junction pumps, an arrangement was entered into, the two companies combining to bear the cost of keeping the pumps going, which up to date they have continued. This arrangement was satisfactory, as both mines are benefited through the water being kept under to the extent of the capacity of the pumps, thus tending to gradually assist in the unwatering of this part of the district. A new shaft has been sunk at the eastern end, with a view of cutting the reef discovered at the low level. This shaft, which is named No. 2 shaft, has reached a depth of 200 ft.; and a cross-cut driven to the north 40 ft., and another to the south 27 ft., have both, at the 200 ft. level, failed to lead to any discovery of quartz so far. The shaft was then continued to a further depth of 250 ft., and cross-cuts are to be driven both ways at this level. In the workings at the western end, the northern cross-cut which reached 611 ft., was further continued to a distance of 823 ft., the latter portion having been done by the Waihi Consols Company for the purpose of prospecting the adjacent ground, which is their property. No reef was discovered in this direction. The drive in the other direction, which had attained a distance of 780 ft., was continued to 827 ft. The reef which had been cut through in this cross-cut was driven on for 92 ft. A winze was sunk 16 ft. on the lode, and payable quartz was discovered 7 ft. from the top. The winze was then carried down vertical, and enlarged to answer the purposes of a shaft. The quartz obtained from the sinking to a depth of 24 ft., at which point the underlay of the reef carried it clear of the vertical shaft, was of a similar character to that first discovered 7 ft. from the top. Assays of samples of quartz taken from this place were as follows: 9th March—Gold, 1 oz. 15 dwt. 2 gr.; silver, 2 oz. 15 dwt. 12 gr.; value, £7 8s. 6d. per ton. 14th March—Gold, 19 dwt. 9 gr.; silver, 1 oz. 19 dwt. 2 gr.; value, £2 16s. 2d. per ton. In order to advantageously develop this part of the mine, a No. 2 shaft was commenced on the surface at a point immediately over the winze, and at a depth of 160 ft. communication was effected with the winze portion already mentioned, and sinking is now being continued with the intention of opening out as soon as a full depth of 260 ft. from the surface is attained. The reef when cut through was found to have a width of 18 ft., and there is every reason to assume that the famous Martha reef will continue to prove of great value in this the adjacent property.

The machinery used consists of a winding-engine, 7 in. by 12 in.; a 14-horse-power Tangye at No. 1 shaft, and at No. 2 shaft a portable winch and boiler, 10-horse power; at the new shaft, western end, an Otis pair 6 in. by 8 in. cylinders, single drum, 34 in. by 12 in., 6-horse power. The pumping machinery consists of a Worthington compound steam-pump, 16 in. by 25 in. by 15 in., rams  $8\frac{1}{2}$  in., duplex, capacity 20,040 to 25,000 gallons an hour, 600 ft. series; one Tangye, 10 in. by 6 in. by 12 in.; one 10 in. by 5 in. by 12 in.; one 8 in. by 4 in. by 12 in.; one 6 in. by 4 in. by 12 in.; one 6 in. by 3 in. by 10 in.; and one duplex, 6 in. by 4 in. by 6 in.; one  $4\frac{1}{2}$  in. by 3 in. by 5 in. boiler-feed pump; a 14-in. air-compressor, with rock-drills; also two 138-horse-power water-tube boilers of the Babcock-Wilcox type. Thirty-seven men were employed.

*Waihi Consolidated Mine* (Area, 200 acres; owners, Waihi Consolidated Gold-mine, Limited).—The shaft in this mine, which had been sunk to a depth of 210 ft., was continued to a depth of 280 ft. Driving on the large reef was continued at the 80 ft. level, and also at the 200 ft. level.

*Waihi Consols Mine* (Area, 200 acres; owners, Waihi Consols Gold-mining Company).—Work was carried on in driving at continuation of the northern cross-cut in the Waihi West shaft, owned by the Grand Junction Company, but no quartz was cut. It was then decided to sink a new shaft, 9 ft. by 5 ft., near the boundary of that claim, but, after reaching a depth of 120 ft., a large body of water was struck, and operations were then suspended, pending negotiations for obtaining a 30-horse-power boiler and pump capable of throwing 10,000 gallons per hour. Nine men were employed.

*Waihi Gladstone Mine* (Area, 66 acres 2 roods 8 perches; owners, Waihi Gladstone Gold-mining Company).—During the year a shaft 6 ft. by 3 ft. was sunk to a depth of 175 ft., a level was opened at 100 ft. down, and 200 ft. of driving was done on a reef 6 ft. in width; a winze was also sunk on this reef, the quartz improving in quality as sinking progressed. Nine men were employed.

*Waihi Extended Mine*.—Very little work has been carried on in this mine. In the month of January only four men were employed in a drive from an adit level 300 ft. in length.

*Waihi South Mine* (Area, 262 acres; owners, Waihi South Gold-mining Company).—During the year the shaft was sunk to a further depth of 70 ft., making a total depth of 220 ft. The rock was hard blue andesite, containing water, and giving off about 7,000 gallons per hour. At the bottom a drive was put in for a water lodgment, and 6 ft. higher up in the shaft a drive was put in to the northward, in the direction of the Waihi Consols ground, with the expectation of cutting the strike of the Welcome lode at about 350 ft. from the shaft. The first 100 ft. was through hard blue rock, then through soft andesite. At a further distance of 130 ft. some quartz stringers were cut 2 in. or 3 in. in width at the bottom, but running off before they reached the top of the drive. Continuing the drive to a total length of 400 ft., alternate hard and soft rock was pierced, but no signs of quartz were seen. Endeavour was then made to sink at the place where the veins of quartz were cut, but, the flow of water proving too great, this work was abandoned, and the claim protected for six months, in order to give the shareholders time to enable further capital to be called up. One 3-horse-power engine was used to drive the winding-gear, and two Tangye special pumps (one 10 in. by 6 in. by 18 in. and the other 8 in. by 4 in. by 12 in.) were used for pumping.

Prospecting operations during the early part of the year were carried on in the Waihi Monument, Great Northern, King of Waihi, Mataura, Waihi Pinnacle, Waitati, Waitati Extended, Waihi Proprietary, and Queen of Waihi Mines in this locality, and at Waihi Beach an amalgamation of interests has been effected, and a strong company formed to prospect the ground.

#### *Wharekiraupunga District.*

*Royal Standard Mine*.—A large amount of money has been expended in laying the tramway, preparations for the foundation of the battery, the construction of a water-race, the manager's house, and necessary buildings, but the manager, who recently arrived from Home, has recommended the directors to stop all works for the present. Mr. T. Pascoe, the manager, reports: "The Royal Standard Gold-mines (Limited) is at present under protection. The number of men that have been regularly employed during the fifteen months the company has been operating has been sixty. The area of land held is 100 acres. The mine is a quartz-mine, and is situated in the Wharekiraupunga district. The reefs, as stated, are composed of quartz, and vary in thickness from 3 in. to 6 ft. The deepest shaft is 50 ft., and the longest adit level about 300 ft. A distance of 685 ft. has been driven on the various reefs at present exploited on the property. The work done to date can be described as prospecting, making surface tramways, water-race, and excavation for machine-site. There is no machinery on the ground, nor has any ore been crushed, with the exception of small test parcels at the Thames School of Mines."

#### *Waitekauri District.*

*Waitekauri Mine* (Owners, Waitekauri Gold-mining Company, Limited).—The mine comprises the following claims: Golden Cross section—Golden Cross Special Claim, 100 acres; Cræsus Special Claim, 100 acres; Tunnel Special Claim, 100 acres; Socket Special Claim, 99 acres 2 roods 6 perches: total, 399 acres 2 roods 6 perches. Komata section—Te Ao Marama Special Claim, 97 acres 3 roods 36 perches; Cross-cut Special Claim, 100 acres; Cross-cut Extended Special Claim, 50 acres: total, 247 acres 3 roods 36 perches. Waitekauri Licensed Holding, 9 acres 2 roods 23 perches. Total of the three sections, 657 acres and 25 perches.

Golden Cross section: There are two shafts in this section of the mine—No. 1 shaft, 317 ft. below the surface, and No. 2 shaft, 195 ft. below the surface. The greatest depth of the workings below the sill of No. 1 shaft is 230 ft. and below the sill of No. 2 shaft 180 ft. There are five levels—(1.) Corbett's level, a drive in the side of the hill 22 ft. below the level of the sill of No. 1 shaft: this is not connected or worked from the shaft. (2.) No. 1 level, north and south of No. 1 shaft. (3.) No. 2 level, north and south of No. 1 shaft. These two levels are connected with No. 1 shaft by cross-cuts. (4.) No. 1 level, north and south of No. 2 shaft. (5.) No. 2 level, north and south of No. 2 shaft. These two levels are connected with No. 2 shaft by cross-cuts. The reef consists of a dark-coloured quartz carrying a large quantity of manganese, and impregnated more or less with very fine iron-pyrites. Its width varies considerably (from 6 ft. to 20 ft., and portions are even wider than this). The greater portion, however, so far opened up is at least from 10 ft. to 15 ft. in width. Development work carried on in this section of the mine is as follows: Sinking Nos. 1 and 2 shafts, driving the western cross-cut (Corbett's level) to prospect the ground to the west of the reef, driving No. 1 level, opening up and driving No. 2 level from No. 1 shaft, opening up and driving No. 2 level from No. 2 shaft, and driving the low-level tunnel. In addition to this, several rises have been carried through between the various levels to open up the reef.

Komata section: The sinking of a shaft, 10 ft. by 4 ft. inside measurements, has been commenced, and it has been sunk to a depth of 40 ft. below surface. The greatest depth of workings in this section of the mine is 200 ft. There are four principal levels—(1) The Gully drive, a drive in the side of the hill; (2) the Hopper level, a drive in the side of the hill at the same level as the

sill of the shaft; (3) No. 1 level, 100 ft. below the level of the sill of the shaft; (4) No. 2 level, 190 ft. below the level of the sill of the shaft. Development work has been carried out during the year as follows: Extending the Hopper level, extending Magazine cross-cut (No. 1 level), cross-cutting at No. 1 level to the east and west, sinking a winze from No. 1 level on a shoot of ore, sinking the shaft, and extending the eastern cross-cut or adit level from the eastern side of the hill.

**Waitekauri Licensed Holding:** The work done in this section during the year consists of the extension of the Queen level on the line of reef, cross-cutting to the westward to prospect the ground, putting up a rise, and sinking a winze on a rich shoot of ore. The Queen level is a drive in the side of the Waitekauri Hill.

**Mine Machinery.**—At the Golden Cross section we have the following machinery at work: No. 1 shaft—One Hirnant air-compressor, worked by steam, 12 in. cylinder, with 2 ft. stroke, nominal horse-power=15: this compressor is used for working the Tangye pumps, and for ventilation purposes. One Tangye winding-engine, double drum, 25 nominal horse-power; one horizontal high-pressure engine, 18 in. cylinder, 3 ft. stroke, and 30 nominal horse-power, for working the pumps. The pumps are of the Cornish type, and consist of one 14 in. forcing set, 175 ft. of column, discharging at the adit level, 130 ft. below the surface. The sinking is carried on by a 6 in. Tangye pump, which lifts the water from the bottom of the shaft to the cistern of the forcing set. There are also two 4 in. Tangye pumps at this shaft, which can be used as auxiliaries to the other pumps, if required. The engines at this shaft are worked from one multitubular boiler, of 30 nominal horse-power, and one Babcock and Wilcox boiler, with Scott's patent furnace, of 30 nominal horse-power. No. 2 shaft: One Fowler winding-engine, double drum, of 25 nominal horse-power; one horizontal tandem compound non-condensing engine, with 13 in. high-pressure cylinder and 20 in. low-pressure cylinder, 3 ft. 6 in. stroke, 35 nominal horse-power. The pumps are of the Cornish type, and consist of one 14 in. draw-lift, with 115 ft. of column, discharging at the adit level, 80 ft. below surface. There is also at the shaft one 4 in. Tangye pump, which can be used as an auxiliary, if required. The engines are worked from one Babcock and Wilcox boiler, similar to the one at No. 1 shaft. Low-level tunnel: At this tunnel there is one Hirnant air-compressor, 10 in. air-cylinder, with 18 in. stroke, belt driven from 5 ft. 10 in. Pelton wheel. This is used for working two rock-drills in the tunnel. These drills are of the Slugger make. Tram-roads: There are four miles and a half of tram-road connecting the mine with the forty-stamp mill. Milling machinery (dry-crushing): One forty-stamp mill, of 1,000 lb. weight each stamper, and a crushing-capacity of 1.60 tons per stamp-head per twenty-four hours; the full forty head of stamps were employed daily; the number of days during the year on which this mill worked was 342. One ten-stamp mill, of 600 lb. weight each stamper, and a crushing-capacity of 0.70 ton per stamp-head per twenty-four hours; the full ten head of stamps were employed daily; the number of days during the year on which this mill worked was 300. One No. 5 Krupp mill; but this is not in use. There are also two stone-breakers, one a Wheeler, with 12 in. jaw, and one from Price, of Thames, with 9 in. jaw; eleven kilns of 250 tons capacity each, and two of 200 tons capacity each; nineteen wooden cyanide-vats of 30 tons capacity each; ten steel cyanide-vats of the same capacity; and three wooden cyanide-vats of 25 tons capacity each; five sumps (four of wood and one of iron), three wooden mixing-tanks, and five zinc filter precipitating-boxes. The power for the milling plant is water, with an auxiliary steam-power. Water-power: Two 6 ft. 8 in. Pelton wheels to work the forty-stamp mill; head of water 195 ft.; length of wrought-iron pipe, 2,000 ft. 28 in. diameter: one 6 ft. Pelton wheel to work the ten-stamp mill; head of water, 162 ft.; length of wrought-iron pipe, 835 ft., of 10 in. diameter: one 4 ft. Pelton, for working the vacuum pump of the cyanide-vats: and one 3 ft. Pelton wheel for working the dynamo for electric light: also one water-wheel, 36 ft. in diameter, 9 ft. wide, high breast driven, for working lathes, &c., in the machine-shop. Auxiliary steam-power: One tandem compound condensing engine by Yates and Thom, of 40 nominal horse-power, worked from two Babcock and Wilcox boilers, of 30 nominal horse-power each, for the forty-stamp mill; and one high-pressure horizontal engine (double cylinder), of 14 nominal horse-power, worked from one multitubular boiler of 14 nominal horse-power, for the ten-stamp mill. Water-races: One for forty-stamp mill,  $3\frac{1}{4}$  miles long, of ten sluice-heads capacity; one for ten-stamp mill, 123 chains long, of five sluice-heads capacity; one for low-level tunnel, 63 chains long, of five sluice-heads capacity.

The total quantity of quartz crushed for the twelve months was 23,383 tons, yielding 51,202 oz. of bullion; value, £55,258 8s. 8d., extracted by the cyanide process. Cost of mining per ton, 11s. 1d.; cost of milling and treatment per ton, 18s. 11 $\frac{1}{2}$ d. Average number of men employed during the year 368, all wages-men.

**Alpha Mine** (Area, 97 acres; owners, Alpha Gold-mining Company, No Liability).—This mine is being well opened up preparatory to the commencement of crushing operations. A site was cleared about 8 chains from the low level, and the battery is now fast approaching completion. It is to consist of twenty stamps, to be driven by steam-power, and wet-crushing and cyanide process is to be adopted. The mill is to be fitted with up-to-date stamps, rock-breaker, berdans, and complete cyanide plant. The mine is opened on the main reef at five different levels. No. 5 level is 100 ft. over the low level, No. 4 level 100 ft. over No. 5. From No. 4, which is 274 ft. on reef, there is a rise through to the surface, a distance of 98 ft. Communication will shortly be effected with the low level, and on the commencement of crushing operations sufficient ground will be available to keep the stamps at work. Seventeen men were employed.

**Waitekauri United Mine** (Area, 109 acres).—This mine is owned by a company of the same name. Development work to a considerable extent has been carried on. The reef, which is from 3 ft. to 4 ft. in width, has been driven on in three levels 80 ft. apart. The quartz is of low value (15s. per ton), and consequently no machinery has been erected. Thirty-seven men were employed.

*New Zealand Jubilee Mine* (Area, 292 acres 2 roods 2 perches).—In No. 2 level, 78 ft. below No. 1, driving and sinking operations have been carried on. The shaft is being sunk from this level at a distance of 600 ft. from the level of the tunnel, which is now 1,000 ft. This level is being driven to intersect the Waitekauri reef.

*Young New Zealand Mine* (Area, 14 acres 1 rood 12 perches).—Cleaning and retimbering the low level, which is now a distance of 460 ft., has been carried on by five men. It is proposed to extend this level, with a view of cutting a series of reefs worked at the higher levels, and 200 ft. more will have to be driven to reach the desired point, and this will give 100 ft. of backs on the reef to the next level. A rise is being put in No. 6 level to the surface, for ventilation purposes.

The *Waitekauri Union* claims are owned by the Waitekauri Union Claims (Limited), an English company, of which Mr. P. M. Hansen is the local secretary and attorney. They consist of two groups, comprising the Central, E.M.C. Extended, Pilot, and Pilot Extended Claims, in the western property, and the Anglian, Nebraska, Australia, California, and Marburg in eastern section, a total area of 625 acres. At the latter group, after the road (three-quarters of a mile in length) from the county road to the proposed shaft site was completed and made fit for the conveyance of heavy machinery, poppet-heads were erected, a small coupled winding-engine and Tangye pump were fitted up, and sinking proceeded with. The object of operations was to sink to a depth of from 300 ft. to 500 ft. according to developments, and then open out and cross-cut from both sides of the shaft to intersect the Golden Cross lode, which at present is the chief gold-producer in the district. Sinking was continued to a depth of 190 ft. employing eighteen men, in three shifts, but at that depth the water increased beyond the capacity of the pump, compelling temporary suspension of operations. The question of the installation of a heavy pumping plant is being considered. In the meantime an adit which will be 300 ft. in length is being driven to connect with the shaft, which should drain much of the water, and allow further sinking to be gone on with. At the western group of claims a number of prospecting tunnels have been driven and various reefs cut and partly opened out, but work is now concentrated on the low level. To this point a road has been made to allow the machinery to be taken up, and an air-compressing plant erected for working the rock-drills. The engine is a coupled one, with 10 in. diameter cylinders and boiler of 65-horse power. The air-pistons are also 10 in. in diameter, and the air is led from the receiver to the drills in 3 in. pipes. The country driven through has been hard bars of andesite alternating with more or less decomposed flows of the same rock, and at least one bed of volcanic breccia. The latter has not been met with for some time, and the country is now a decomposed andesite. The face of the level is in over 800 ft., and, in addition to the compressed air, it is ventilated by pipes exhausting by water-jet, and a third line supplies a spray jet at the drills. Several known lines of reef will be cut as the tunnel is extended, and it is on the grade of the ore to be met with that much of the success of the company will depend. Mr. N. D. Cochrane is the mining engineer and general manager, and Mr. J. Coombe is mine-manager. Throughout the year over forty men have been employed, but at present the number is reduced to twenty-four. Fully two miles of roads and tracks have been constructed, and up to the 1st May, 1898, altogether over £16,000 has been expended by the company.

*Grace Darling Mine* (Area, 90 acres).—The reef, which averages 5 ft. in thickness, has been driven on a distance of 400 ft. in a southerly direction, and to the north a distance of 300 ft. Fifty tons of stone yielded 58 oz. 12 dwt. of gold.

*Waitekauri Junction Mine* (Area, 60 acres).—Driving at a low level to intersect a reef trenched on the surface is now being carried on, the level being in a distance of 60 ft. Four men are employed.

*Waitekauri Extended Mine* (Area, 95 acres 2 roods 19 perches).—The principal work at present is the driving of the low level, which is in 820 ft. A further distance of 300 ft. must be driven to cut the reef, which in No. 2 level has been driven on 500 ft. Cross-cuts have been put in at intervals of 50 ft. along the reef, which runs north and south, 250 ft. of backs being available between the low level and No. 2 level, where sinking operations are to be proceeded with on the reef, in order to establish a connection with the point at which the low level will intersect the reef. Twenty heads of stamps for the battery are already erected, and further twenty heads will complete it. The ore is of a low grade, but is considered payable.

*Grafton United Gold-mining Company's Mine*.—The chief work carried on in this company's mine is driving the low level to intersect the Golden Cross reef. It is in a distance of 550 ft., through a somewhat tight class of country. Twenty-eight men are employed.

*Waitekauri Reefs Company*.—The chief work undertaken in this company's mine has been the cleaning out and retimbering the Stephens No. 2 level in order to intersect the Waitekauri South No. 2 reef in the low level. Driving on the reef, which is some 2 ft. 6 in. in width, has been carried on. The ore at present is of a very low grade, and not considered payable.

*Waitekauri Cross Mine* (Area, 100 acres; owner, Waitekauri Cross Gold-mining Company).—A large reef, varying from 14 ft. to 60 ft., runs through the ground, of an appearance similar to the Golden Cross reef in the Waitekauri Company's ground adjoining. The main cross-cut was driven 300 ft., and the drive on the Taranaki reef at the adit level advanced 324 ft., and the reef cross-cut through from wall to wall at every 50 ft. A winze has also been sunk on this reef to a depth of 88 ft., where a second level was driven for a distance of 60 ft., and two cross-cuts were put through the reef, the average thickness being 24 ft. A prospecting shaft was sunk on the eastern portion of the property, which had to be abandoned at 80 ft., through an influx of water, which was too much for the power which was then available—viz., a horse-whip. There are two water-races belonging to the company, one of which, the Maratoto, is 65 chains long, and has a carrying-capacity of five sluice-heads. The construction of this race is complete. The second, or Whakamoehau, is 55 chains long, and has a carrying-capacity of six sluice-heads. Men are now busy with this race-construction, the benching being almost complete. These two races converge at the same level, and have a vertical fall of 210 ft. About £800 has been



spent on these races. A contract has been let to Seager Brothers for fixing a line of 24 in. wrought-iron pipes from the receiving-tank at the end of the water-races to the machine-site, it being the intention of the company to generate power by means of electrical dynamos, which will be driven by a Pelton wheel. This power will be transmitted to the mine, a distance of two miles, where it will be used for sinking the shaft on the reef, as power for hauling, pumping, and crushing when required. The electrical machinery for the above is now on the road to New Zealand from England and America. The average number of men employed during the year is twenty-nine, wages and contract.

#### *Te Aroha District.*

This district is situated to the southward of Ohinemuri County, and includes portions of the Tauranga and Ohinemuri Counties, but the largest area lies in the Piako County. Operations are being conducted with a view to the treatment of the refractory ores with which the district abounds. The following list shows the claims in this district:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Te Aroha, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Te Aroha.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. B. P.					
1/6/95	26 2 32	Waiorongomai	X.	Aroha	New Find No. 1 ..	Aroha Gold-mines (Ltd.).
1/6/95	10 1 2	"	"	"	New Find No. 2 ..	"
13/9/95	60 0 0	"	"	"	Sceptre ..	"
13/9/95	99 0 0	"	XII.	Katikati	Sceptre Extended	"
28/6/95	28 1 25	"	II.	"	"	"
26/9/95	20 0 0	Te Aroha	X.	Aroha	Loyalty Palace ..	P. Snewin.
25/10/95	10 2 34	Waiorongomai	IX.	"	Mount Morgan ..	J. Williams.
			XII.	"	Welcome ..	R. Burke.
18/11/95	100 0 0	"	X.	Katikati	Empire ..	Aroha Gold-mines (Ltd.).
28/11/95	29 3 10	Te Aroha	XI.	Aroha	Golden Crown ..	J. Williams.
10/1/96	49 1 20	"	IX.	"	Montezuma ..	"
1/2/96	43 2 23	Tui	X.	"	Day Dawn ..	J. A. Pond.
1/2/96	50 0 0	"	"	"	Grand Junction ..	E. Griffith.
27/1/96	29 3 11	Te Aroha	"	"	Plutus (L.H.) ..	W. T. J. Bell.
30/4/96	99 0 0	Waiorongomai	"	"	Gentle Annie ..	W. Steele.
30/4/96	99 0 30	"	"	"	Great Western ..	T. Gavin.
30/4/96	50 0 0	Tui	IX.	"	Plutus ..	C. F. Bell.
19/5/96	17 0 0	"	X.	"	Plutus No. 2 ..	W. T. J. Bell.
29/6/96	94 0 0	Waiorongomai	"	"	New Munster ..	New Munster Gold-mining Co. (Ltd.).
16/7/96	100 0 0	"	XII.	"	Trident ..	Aroha Gold-mining Co. (Ltd.).
16/7/96	50 2 16	Tui	X.	"	Silver King ..	G. B. Osmond.
29/4/96	94 0 9	"	IX.	"	Waitara ..	J. Wallace.
16/10/96	100 0 0	"	IX., X.	"	Merchant of Venice ..	R. Kelly.
16/10/96	100 0 0	"	"	"	Gipsy King ..	A. E. Langley.
20/10/96	99 1 21	"	IX.	"	Te Aroha ..	R. Dovell.
24/10/96	99 0 17	"	X.	"	Grand Result ..	T. McIndoe.
30/11/96	46 3 32	"	V., IX.	"	Te Aroha Extended	R. Dovell.
30/11/96	99 0 0	"	X.	"	Mount Ryan ..	W. Shaw.
11/12/96	27 2 0	"	"	"	Manchester ..	A. A. Lockwood.
18/1/97	100 0 0	Tui	"	"	Waitara Extended	A. B. Millar.
13/1/97	96 0 4	"	IX., X.	"	Ethel Reef ..	Ethel Reefs Gold-mining Co.
21/1/97	19 1 0	"	X.	"	Ballarat ..	C. J. Sanderson.
22/8/97	79 2 0	"	"	"	Ajax ..	R. Lohest.
22/3/97	99 2 16	"	"	"	Ajax Extended ..	"
22/3/97	98 1 6	Tui	"	"	Tui ..	Tui Gold-mines (Ltd.).
24/3/97	93 0 0	Waiorongomai	XI.	Katikati	Loyalty Extended	W. Newsham.
10/5/97	27 0 15	"	"	"	Edendale ..	J. Campbell.
26/6/97	99 0 0	Tui	X.	Aroha	Mount Ryan Ext.	W. Shaw.
7/10/97	96 1 12	Te Aroha	IX., X.	"	Hot Springs ..	Inland Reefs Gold-mining Co.
23/12/97	98 2 32	"	"	"	Wallaby ..	John Phillips, jun.
24/3/98	78 1 34	Waiorongomai	XII.	Aroha	Cadman ..	J. Mills.
24/3/98	30 2 0	"	"	"	Montezuma Ext.	J. Campbell.

#### *Piako.*

*Aroha Gold-mines (Limited).*—The following work was done on the Aroha Gold-mines property for the period commencing the 1st April, 1897, and ending the 31st March, 1898. The principal work carried on was the driving of the main low tunnel. This tunnel is now in 1,230 ft. The size has been reduced from 12 ft. by 8 ft. to 8 ft. by 8 ft. It is being driven along the western wall of the main reef, the course being about due north. Up to the present it has been driven on contract by hand-labour. The tunnel is closely timbered with 10 in. by 8 in. sawn rimu, with split slabs. A 20 in. by 9 in. rimu box-drain is carried along the centre of the drive underneath the tram-line, which is a single line with pass loops, laid of 14 lb. steel rails on 6 in. by 4 in. sleepers. The cost of the tunnel per foot when completed will be about £3. Three cross-cuts have been put through the reef, and a fourth is being put through at present in the face, where there is a strong reef. It has been broken into 4 ft., but so far, while carrying a little gold and silver, is not payable. The air is good, though a little warm, and is being kept cool by means of a water-blast and fire-draft, which are both temporary, being connected with the 2 in. and 7 in. pipes laid for the rock-drills which it



is intended to use in driving the tunnel later on. The water-blast is sending the air along the 2 in. pipe, while a small furnace connected with the 7 in. pipe is drawing out the smoke and warm air. This keeps the face cool and clear of fumes from the explosives. Blasting gelatine is used. This is found to be very effective, as the amount used per month is only 150 lb., while the distance driven is 80 ft., and the ground taken out is 10 ft. by 10 ft. The tunnel is fairly dry, the largest stream of water met with being in the face at present. In connection with and for the purpose of driving this tunnel a large air-compressor has been erected close to the mouth. This is to be driven by water-power, to be supplied from a new high-level water-race, which was constructed for this purpose. This race is connected with the 10 ft. Pelton wheel by 1,300 ft. of 14 in. steel pipes, giving an effective fall of 640 ft., which will enable the Pelton to be driven 190 revolutions per minute, developing 104-horse power. The compressor has a capacity of 820 ft. of free air per minute, at a pressure of 75 lb. to the square inch, with eighty-six revolutions. All this work is just about completed, and with the aid of the drills the tunnel should be carried on much faster and cheaper than at present. Besides this tunnel there have been two other drives driven—one in the Colonist Creek section of the property, driven on the course of the main reef a distance of 400 ft., at a cost of £795; and the other on a cross-lode known as the Silver King, on which 278 ft. was driven, at a cost of £486. The ore in both places is of a low grade. The average number of men employed for the period mentioned was forty-four, and the total amount of money spent in the same time is about £9,500. There has been no ore crushed, the battery being idle all the time.

*Tui Gold-mines, Limited* (Area, 100 acres; owners, Tui Gold-mining Company).—These claims are at present protected, but previously seventeen men were employed. Five levels have been opened, varying in depth from 30 ft. to 270 ft. The main reef, originally termed the Champion lode, is the only one yet worked on, and runs north-east and south-west, averaging a width of about 6 ft. The ore is fully charged with minerals, making it difficult to treat. Operations in the mine have been partially stopped, pending the completion of Campbell's works at Te Aroha for the treatment of ore by the thermo-hyperphoric process. On the completion of the works a quantity of ore will be immediately forwarded from the mine. Should the process prove a success the mine will at once be fully manned. Five men are at present employed.

*Great Western Mine*.—A small crushing plant has been erected in this company's mine, which was formerly known as No. 2 New Find, Waiorongomai. It varies from 2 ft. to 12 ft. in thickness. Thirty-four men were employed.

*Loyalty Mine*.—Fifty tons of quartz is ready for crushing. Two men are employed.

*Great Result Mine*.—A trial crushing of quartz from this mine will be sent to the Montezuma battery when the tramway is in repair.

*Montezuma Mine* (Area, 70 acres).—Driving has been carried on in the No. 2 level of the Waterfall reef, some 2 ft. 6 in. wide. The drive is in a distance of 250 ft. The stone is of poor quality. Operations are also being carried on in the Waitara and Plutus sections of the mine.

In the month of January last I visited Te Aroha, where the thermo-hyperphoric reduction plant was approaching completion, under the superintendence of the Rev. Joseph Campbell. The building, in which there are three floors, is 100 ft. by 80 ft. In the upper floor a 9-horse-power boiler, heated by Waikato coal, will generate the steam to work the Dowson gas, for which purpose a gasometer, 12 ft. in diameter, a generator, and purifier, have been erected. This gas will be used for driving a 75-horse-power gas-engine. The plant for the thermo-hyperphoric treatment (which has not yet arrived) will consist of three generators, to be worked on the intermittent system. These will be on the second floor. The producer gas, which is first made, is used for heating the furnace, and the water gas for the thermo-hyperphoric treatment. A stone-breaker will reduce the ore to  $\frac{1}{4}$  in. mesh, and it will then pass on to an Askam Brothers' Tiger-mill, capable of pulverising it to any degree of fineness required, the present intention being to reduce it to the size of grains of wheat. The ore will then be elevated to large hoppers, erected over the furnace, from which three small hoppers are to be fed. These will immediately discharge into the furnace, which is to be heated up to 2,000° Fahr. by the producer gas, and will consist of a bed of eight retorts, with a capacity of 40 tons per day. Whilst in the retorts the ore will be subjected to the action of the water gas, which it is claimed has the effect of eliminating all the base materials, or reducing them to such a condition that it does not interfere with amalgamation. The ore is then conveyed to a Merrill's Tension mill of 40 tons a day capacity, with a mesh of about 40 to the inch. This mill, in which mercury is to be used, both grinds and amalgamates, and it is anticipated that a saving of 80 per cent. of the gold will thus be effected. From the mill the ore is conveyed by launders to three "Gold King Amalgamators," which it is expected will save the greater portion of the residue, or in all about 95 per cent. Work is at present being carried on in the Montezuma and five other properties, in which the lodes are being systematically opened up. A self-acting wire tram is on the ground, and will be erected as soon as the most suitable place has been determined. The cost of treatment of the ore, from the time it is delivered at the mill, is estimated by Mr. Campbell at not more than 8s. per ton, and, as it is anticipated that 95 per cent. of the bullion will be saved by the thermo-hyperphoric process, it should prove a cheap method of treatment for the large bodies of low-grade ores at Te Aroha, Waiorongomai, and other places, and be the means of affording employment to a large number of miners.

#### *Tauranga District.*

This district comprises the northern part of the County of Tauranga. Mining operations have not yet been conducted to a very great extent. The lands occupied are in some instances freehold. The following list, however, shows the claims held under goldfields titles:—

ABSTRACT of LICENSES for SPECIAL CLAIMS issued from the Warden's Office at Tauranga, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the books of the Mining Registrar at Tauranga.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. B. P.					
7/10/96	100 0 0	Aongatete	IV.	Aongatete ..	Eliza ..	Henry M. Shepherd.
14/6/97	100 0 0	Te Puke	IX.	Maketu ..	Bay of Plenty No. 2	Joshua Wright.
28/10/97	100 0 0	"	V.	" ..	The Sisters ..	K. te Atirau and M. te Atirau.
21/7/97	100 0 0	"	"	" ..	The Rata ..	J. G. Vercoe.
15/10/97	100 0 0	"	Waitaha No. 1	" ..	The Patiria ..	D. Lundon.
28/10/97	100 0 0	"	V.	" ..	The Pukekura ..	W. C. Piggott.
28/10/97	100 0 0	"	"	" ..	The Pukerima ..	J. S. Jameson.
28/10/97	100 0 0	"	"	" ..	The Puke Pai ..	F. N. Challis.
28/10/97	100 0 0	"	"	" ..	The Pukehina ..	W. Norton.
28/10/97	100 0 0	"	"	" ..	The Pukema ..	M. Dockerill.
28/10/97	100 0 0	"	"	" ..	The Puketora ..	E. E. Vaile.
22/4/98	97 2 29	"	"	" ..	The Problem ..	C. McLean.

*Tauranga and Katikati District.*

In this district a number of claims have been taken up, but no important discoveries have been made, and only four men are employed in prospecting.

*Te Puke District.*

The Government Geologist (Mr. Alexander McKay, F.G.S.) and the Inspector of Mines (Mr. James Coutts) visited Te Puke Goldfield last month, and examined the various mine-workings on and adjacent to Fleming's Freehold. The following extracts give the main points of the report furnished to the department by Mr. McKay:—

"The country forming the lower grounds between Tauranga Harbour and the main range to the westward from near Captain Stewart's and Hikurangi at first is rhyolite *débris*, from the area of rhyolite of which Hikurangi is the culminating peak. Further south pumiceous sands and clays form the country along the seaboard back to the mountain range, composed of andesic materials; but until reaching about half-way from Katikati to Tauranga the material is not coarser than sand, and gives clear evidence of having been stratified under water—probably an extension of the Bay of Plenty. Three miles south of Katikati a considerable stream flows from the mountain range north-east into the Katikati arm of Tauranga Harbour, and the gravels of this divide the stratified pumiceous sands and clays to the north from the larger area of the same rocks that lies to the south. The main range south of Thompson's Track, after forming a massive mountain, descends to lower heights, and to the south and south-east forms hills separated by deep gullies, constituting a country not high but somewhat broken. The western border of this forms a steep scarp descending to the level of the plain along which flows the Waihou or Thames River. The pumiceous deposits seen along the road from Katikati to Tauranga evidently reach on to this hilly area, and as followed south towards Tauranga become coarser in character, and pieces of pumice and fine gravel of pumice are seen in most of the road-cuttings that reach to a moderate depth from the surface. This state of things continues to Tauranga, when andesic rocks appear on the north side of this part of the harbour, and in the high hill on the east side of the entrance thereto. To the south-west from Tauranga the country is comparatively low for a considerable distance, and in this direction the pumiceous rocks continue further than was determinable, and divide the block of mountains lying towards Te Puke from the southern continuation of the Cape Colville Peninsula Ranges and the high levels west of the Tauranga-Rotorua Road, which have already been mentioned. There is thus a complete separation of the two areas of auriferous rock, and the popular idea that the Te Puke Goldfield is connected with, and forms but the southern continuation of, the Hauraki Goldfields is not supported by the facts above stated.

"Leaving Tauranga, the stratified pumiceous rocks continue to a distance of six or seven miles on the road to Te Puke, beyond which they give place to brecciated rocks of a dark colour and more distinctly rhyolitic type. These are seen at various points along the road, and, becoming massive developments, form rounded hills of considerable height, and the northern part of the mountainous country that continues to and beyond the Te Puke Goldfield. East of the goldfield these rocks form the eastern lower slopes of the mountain range, and are deeply cut into by the stream surrounding Fleming's Hill to the south and east, and continue in a south direction beyond the limits of the auriferous rocks terminating near Gibraltar Rocks, which (though not visited) are evidently rhyolite. The rocks containing the auriferous reefs are decomposed andesites that are not only highly decomposed along the walls of the lodes in Fleming's Hill, but everywhere where openings have been made. Less than a mile to the north the creeks draining from this part show the presence of dark andesites undecomposed, although at the Sisters Claim the rocks showing in the banks of the stream are highly decomposed. To the south and south-west there is every appearance of these rocks being cut off by rhyolites within a distance of two miles. To the north the auriferous rocks apparently extend fully three miles, while to the westward they reach the water-divide of the higher range, and descend some distance the western side of the range; how far has not been ascertained. Reefs of quartz form at least two or three distinct lines in Fleming's Hill, and where opened out, show a very considerable thickness of quartz, usually exceeding 20 ft. The quartz is of light-grey colour generally, but at one place it is dark from the presence of sulphide of iron. Near surface it has the appearance of having been deposited by the agency of hot water, and in the levels of the eastern lode banded spongy and solid grey or creamy quartz is met with in

different parts of the same intersection of the lode. Highly mineralised stone was only seen at one place on the western slope of the hill, and apparently away from the main outcrop on this side of the hill. The stone generally resembles that of the Waihi Mine, Waihi, and, like it, is undoubtedly due to hydro-thermal agencies, but, as on Martha Hill so here, there is no evidence of sinter deposited at the surface. This, if it ever existed, has been removed by denudation, and only the channels filled with quartz, by way of which such reached the surface, together with the highly decomposed surrounding country, testify to the nature of the action by which the ore-bodies were formed. The curly, twisted, agate-like quartz of the higher levels of the Waihi Mine does not appear abundant on the Te Puke field; and this, on consideration, seems to be the main difference in a mere comparison of the quartz. As regards the amount of gold present in the stone, the analysis made by the owners is the only source of information. A large number of samples would be required to determine the average yield per ton, and the time at my disposal did not suffice for the making of such a collection of specimens. The return of samples tested seem to indicate that in different parts the stone varies in value, but is scarcely ever wanting in gold; and it is confidently expected that larger parcels, when treated, will prove the paying character of the ore. On the Sisters Claim there has not been sufficient work done to prove the size of the lode or the value of the ore, but the indications clearly pointed to the presence of a lode of at least moderate size, and a sample analysed, taken from a lode cut in one of the drives, is reported to us as having afforded what may be considered an excellent return. This, however, does not seem to have been verified by the obtaining and testing of further samples. I was shown a sample of alluvial gold which was obtained on the slope of the range north of the Sisters Claim. This was in the possession of Mr. Griffiths, of Tauranga. It consisted of a few pieces of coarse nuggety gold, of apparently considerably greater purity than the reef gold of the neighbourhood; and, from the position pointed out as that from whence it came, it would appear that it cannot be referred to any alluvial deposit covering the low grounds and belonging to the recent period, or from a modern wash in the bed of a mountain creek. It is said to come from a bed of pipeclay exposed in the spur of the range about two miles north of Fleming's Hill, and future examination will be required to determine the true nature of the deposit in which the gold is found."

#### MACHINERY.

Mr. John Chambers, of Auckland, who supplies most of the mining machinery, has afforded the following information, and also gives a list of plants erected by his firm during the year:—

**Mining machinery:** The demand for the year ending the 31st March shows a falling-off from previous year, caused by the stoppage of nearly all the local companies, the mines now being worked energetically being supplied with funds from foreign sources. We have supplied a good many of the mines with the Tangye steam-pumps; in fact, nearly all the mines are now using them, sometimes for all purposes, but in others as auxiliary. This department has done well.

**Centrifugal pumps:** There has been a good demand for these; for instance, we sold twelve 8 in., ten 10 in., and three 12 in., besides other sizes; these were mostly for Otago dredging; we have now many on order.

**Winding-engines:** We supplied the Thames-Hauraki with a fine pair of direct-acting, cylinders 14½ in. by 28 in. stroke, with indicators to indicate position of cage in shaft.

We have also sold to the Kauri Freehold Gold Estates (Limited), Maiden Mine, Opitonui, a substantial winding and pumping plant, consisting of a pair of Tangye's 10 in. by 20 in. winding-engines, geared forward, with a steam-pump to throw 10,000 gallons per hour, a 25-horse-power Tangye's Cornish boiler, pit-head poppets, and other gear.

**Jubilee Gold-mining Company:** This company has put down a small winding and pumping plant, two Tangye's colonial boilers, &c.

**Fortuna Gold-mining Company, Thames:** A small temporary winding plant, consisting of hauling-engine, with a pair of 5 in. cylinders, Tangye's vertical special pump, and colonial tubular boiler.

**Waitekauri Union Mine, Nebraska Section:** One Tangye's coupled geared winding-engine, with pair of 6 in. by 12 in. cylinders, 10-horse-power colonial tubular boiler and steam-pump complete.

**Hauraki Main Lodes, Coromandel:** One pair of Tangye's winding-engines, geared forward, with cylinders 10 in. diameter by 20 in. stroke, 5 ft. drums, 25-horse-power boiler, pump, &c., complete.

**Hauraki South, Coromandel:** Small pumping and winding plant.

**Electric-light installations:** The following batteries have been fitted up during the year:—Waihi Gold-mining Company's Waikino battery, Waikino; Moanataiari Gold-mining Company's works, Thames; Woodstock Gold-mining Company, Karangahake; Talisman Gold-mining Company, Karangahake; Crown Gold-mining Company (Limited), battery and mine; and Komata Reefs battery, Komata.

## RETURN OF STONE, ETC., CRUSHED—AUCKLAND DISTRICT.

District.	Quartz and Mullock crushed or sold.	Yield of Gold or Bullion.	Average Yield of Gold or Bullion per Ton.		
<i>Coromandel—</i>	Tons.	Oz.	Oz.	dwt.	gr.
Output for 10 years previous to 1st April, 1890	15,101	56,232	3	14	11
1st April, 1890, to 31st March, 1891 ...	5,650	9,838	1	14	19
" 1891, " 1892 ...	13,029	12,191	0	18	17
" 1892, " 1893 ...	15,163	12,954	0	17	2
" 1893, " 1894 ...	12,629	9,969	0	15	18
" 1894, " 1895 ...	15,451	22,632	1	9	18
" 1895, " 1896 ...	27,439	48,378	1	15	6
" 1896, " 1897 ...	18,848	35,886	1	18	2
" 1897, " 1898 ...	13,666	27,428	2	0	3
Totals ... ..	136,976	235,508	1	14	9
<i>Thames—</i>					
Output for 12 years previous to 1st April, 1890	441,388	556,878	1	5	6
1st April, 1890, to 31st March, 1891 ...	61,756	38,113	0	12	8
" 1891, " 1892 ...	86,150	45,735	0	10	15
" 1892, " 1893 ...	78,547	31,336	0	7	23
" 1893, " 1894 ...	62,444	34,637	0	11	2
" 1894, " 1895 ...	48,464	22,810	0	9	10
" 1895, " 1896 ...	44,342	26,332	0	11	21
" 1896, " 1897 ...	27,061	13,440	0	9	22
" 1897, " 1898 ...	20,850	13,482	0	12	22
Totals ... ..	871,002	782,763	0	17	23
<i>Ohinemuri—</i>					
1st April, 1887, to 31st March, 1888 ...	2,388	3,406	1	8	13
" 1888, " 1889 ...	3,795	3,679	0	19	9
" 1889, " 1890 ...	4,773	8,564	1	15	21
" 1890, " 1891 ...	9,902	12,914	1	6	2
" 1891, " 1892 ...	13,865	23,659	1	14	2
" 1892, " 1893 ...	22,771	43,405	1	18	3
" 1893, " 1894 ...	31,281	35,666	1	2	18
" 1894, " 1895 ...	51,058	110,628	2	3	8
" 1895, " 1896 ...	57,008	147,499	2	11	18
" 1896, " 1897 ...	66,985	148,626	2	4	9
" 1897, " 1898 ...	100,126	280,708	2	13	9
Totals ... ..	368,952	810,754	2	4	9
<i>Te Aroha—</i>					
1st April, 1883, to 31st March, 1884 ...	4,262	4,629	1	1	17
" 1884, " 1885 ...	11,042	9,506	0	1	5
" 1885, " 1886 ...	6,552	4,489	0	13	17
" 1886, " 1887 ...	4,743	3,658	0	15	10
" 1887, " 1888 ...	7,166	2,918	0	8	3
" 1888, " 1889 ...	1,381	1,113	0	16	3
" 1889, " 1890 ...	4,894	20,416	4	3	10
" 1890, " 1891 ...	280	557	1	19	18
" 1891, " 1892 ...	2,722	979	0	7	5
" 1892, " 1893 ...	3,169	1,178	0	7	2
" 1893, " 1894 ...	2,270	833	0	7	8
" 1894, " 1895 ...	1,121	628	0	11	5
" 1895, " 1896 ...	172	168	0	19	12
" 1896, " 1897 ...	934	376	0	8	1
" 1897, " 1898 ...	...	...	...	...	...
Totals ... ..	50,708	51,448	1	0	7
<i>Great Barrier—</i>					
1st April, 1896, to 31st March, 1897 ...	3	219	73	0	0
" 1897, " 1898 ...	2	45	22	10	0
Totals ... ..	5	264	52	16	0
Grand totals from North Island ...	1,427,643	1,888,737	1	6	11

STATEMENT SHOWING THE WHOLE OF THE QUARTZ-CRUSHING MACHINES AND APPLIANCES FOR TREATING AURIFEROUS AND ARGENTIFEROUS ORES IN THE HAURAKI MINING DISTRICT FOR THE YEAR 1897-98.

Locality where Machine is situated.	Name of Machine.	Name of Owners.	Number of Rock- breakers.	Number of Stamps.	Number of Ore-crushers and Lamberton Mills.	Number of Berdams.	Number of Pans.	Number of Settlers.	Number of Mortars.	Number of Retorts.	Number of Furnaces for Gold-melting.	Number of Furnaces for Assay Purposes.	Number of Plants for Cyanide Process.	Concentrating Plant.	Driven by Steam-power.	Driven by Water-power or Hand-power.
<i>Coromandel County.</i>																
Coromandel ..	Kapanga ..	Kapanga Gold-mining Company	..	10 ..	..	2 ..	..	1 2	..	..	..	..	..	1	W. H.	
" ..	Telephone ..	Hauraki Gold-mining Company	..	15 ..	..	8 ..	..	2 3	..	..	..	..	..	1	..	
" ..	Corby ..	Scotty's Gold-mining Company	..	9 ..	..	8 ..	..	1 2	..	..	..	..	..	..	1 0	
" ..	*Hauraki North ..	Hauraki North Gold- mining Company	..	.. 1	..	1 ..	..	1 1	..	..	..	..	..	1	..	
" ..	Success ..	Success ..	..	10 ..	..	4 ..	..	1 1	..	..	..	..	..	1	..	
" ..	Hauraki ..	Associated ..	..	12 ..	..	4 ..	..	2 2	2 ..	..	..	..	..	1	1 0	
" ..	Tokatea ..	Tokatea Company ..	..	15 ..	..	2 ..	..	1 1	..	..	..	..	..	1	..	
" ..	Triumph ..	Triumph Company ..	..	10 ..	..	2 ..	..	1 1	..	..	..	..	..	1	..	
Opitonui ..	Lanigan's ..	J. Thompson and party	1	10 ..	..	2 ..	..	1 2	..	..	..	..	..	..	1 0	
Owera ..	Owera ..	..	1	10 ..	..	4 ..	..	1 2	..	..	..	..	..	..	1 0	
Kuaotunu ..	Try Fluke ..	Mariposa Gold-min- ing Company	..	16 ..	..	3 ..	..	2 2	1 1	1 ..	1 ..	1 ..	1 ..	1	..	
" ..	Great Mercury ..	Great Mercury Gold- mining Company	..	10 ..	..	1 4	2 4	1 ..	1 1	1 ..	1 ..	1 ..	1 ..	1	..	
" ..	Irene ..	Irene Gold-mining Company	..	10 ..	..	2 4	..	2 2	1 1	1 ..	1 ..	1 ..	1 ..	1	..	
" ..	Kapai-Vermont ..	Kapai-Vermont Gold- mining Company	1	.. 1†	..	1 ..	..	2 2	1 1	1 ..	1 ..	1 ..	1 ..	1	..	
" ..	Matarangi ..	Matarangi Syndicate	..	10 ..	..	2 2	1 2	1 ..	..	..	..	..	..	1	..	
Mania ..	Golden Hill Ex- tended	Golden Hill Extended Company	..	2 ..	..	1 ..	..	1 1	..	..	..	..	..	1	..	
<i>Thames County.</i>																
Tapu ..	Sheridan ..	Sheridan Gold-mining Company	..	15 ..	..	4 ..	..	3 3	..	..	..	..	..	..	1 0	
Mahara ..	Royal ..	Mahara Royal Gold- mining Company	..	10 ..	..	..	..	..	..	..	..	..	..	..	1 0	
Waiomo ..	Monowai ..	Monowai Amalg- amated Gold-mining Company	1	10 ..	..	1 ..	..	1 1	1 1	1 1	..	..	..	..	1 0	
Tararu ..	Scandinavian ..	Scandinavian Gold- mining Company	..	8 ..	..	4 ..	..	1 1	..	..	..	..	..	1	..	
" ..	New Alburnia ..	New Alburnia Gold- mining Company	..	20 ..	..	7 2	..	1 3	1 ..	..	..	..	..	..	1 0	
" ..	Norfolk ..	Tararu Mines Gold- mining Company	..	30 ..	..	6 ..	..	3 2	..	..	1 1	..	..	..	1 0	
" ..	Berry's ..	Charles Berry ..	..	1 ..	..	3 ..	..	1 2	1 ..	..	..	..	..	..	1 0	
Karaka ..	Claremont ..	George Bryant ..	..	1 ..	..	1 ..	..	1 3	..	..	..	..	..	..	1 0	
" ..	Karaka ..	J. C. Smith ..	..	5 ..	..	2 1	..	1 3	..	..	..	..	..	..	1 0	
Hape Creek ..	Anchor ..	Hauraki Anchor Com- pany	..	4 ..	..	1 ..	..	1 1	..	..	..	..	..	..	1 0	
Puriri ..	Puriri ..	Puriri Gold-mining Company	..	6 ..	..	2 ..	..	1 1	..	..	..	..	..	..	1 0	
Tairua ..	Bonnie Scotland ..	McLiver ..	..	20 ..	..	6 ..	..	2 1	..	..	..	..	..	1	..	
" ..	Ajax ..	McLiver ..	..	12 ..	..	4 ..	..	1 1	..	..	..	..	..	1	1 0	
" ..	Cannon's ..	Richard Cannon ..	..	4 ..	..	1 ..	..	1 1	..	..	..	..	..	1	..	
Thames Borough ..	Brown's ..	James Brown ..	..	..	..	4 8	4 ..	2 ..	..	..	..	..	..	..	1 0	
" ..	Kuranui ..	Kuranui Gold-mining Company	..	20 ..	..	10 ..	..	1 1	1 1	1 ..	..	..	..	..	1 0	
" ..	Moanataiari ..	Moanataiari Gold- mining Company	..	60 ..	..	21 4	..	2 6	3 1	1 1	1 ..	1 ..	1 ..	2	0	
" ..	Judd's ..	Charles Judd ..	..	..	..	2 9	..	..	1 ..	..	..	..	..	..	1 0	
" ..	Comer's ..	Kuranui - Caledonian Company	..	20 ..	..	5 ..	1 2	..	..	..	..	..	..	..	1 0	
" ..	Bowden's ..	..	..	..	..	2 13	..	..	1 1	1 ..	..	..	..	..	1 0	
" ..	May Queen ..	May Queen Gold- mining Company	..	33 ..	..	8 3	..	2 3	2 ..	..	..	..	..	..	1 0	
" ..	Cambria ..	Moanataiari Gold- mining Company	..	21 ..	..	13 1	..	2 5	1 ..	..	..	..	..	..	1 0	
" ..	Waiotahi ..	Waiotahi Gold-mining Company	..	21 ..	..	5 ..	..	2 2	1 ..	..	..	..	..	..	1 0	
" ..	Fame and Fortune ..	Hauraki Golden Age Mines (Limited)	2	40 ..	..	13 ..	..	1 1	..	..	..	..	..	..	1 0	
" ..	School of Mines ..	F. B. Allen ..	..	2 ..	..	1 1	1 3	3 1	4 1	..	..	..	..	..	1 0	
" ..	Bank of New South Wales, H. P. Stark	H. P. Stark ..	..	..	..	..	..	1 ..	1 1	..	..	..	..	..	0 1	
" ..	Bank of New Zea- land	A. Smith ..	..	..	..	..	..	2 ..	1 3	..	..	..	..	..	0 1	
" ..	May Queen Ex- tended	May Queen Extended Company	..	23 ..	..	14 ..	..	2 4	1 ..	..	..	..	..	..	1 0	
" ..	Fairmile ..	W. Manning ..	..	..	..	1 ..	..	1 1	1 1	1 ..	..	..	..	..	1 0	

\* Robinson ore-crusher, equal to five stamps.

† Otis mill.

STATEMENT SHOWING THE WHOLE OF THE QUARTZ-CRUSHING MACHINES, ETC., IN THE HAURAKI MINING DISTRICT FOR THE YEAR 1897-98—*continued.*

Locality where Machine is situated.	Name of Machine.	Name of Owners.	Number of Rock-breakers.	Number of Stamps.	Number of Ore-crushers and Lamberton Mills.	Number of Berdams.	Number of Fans.	Number of Settlers.	Number of Mortars.	Number of Retorts.	Number of Furnaces for Gold-melting.	Number of Furnaces for Assay Purposes.	Number of Plants for Cyanide Process.	Concentrating Plant.	Driven by Steam-power.	Driven by Water-power or Hand-power.
<i>Ohinemuri County.</i>																
Paeroa ..	Bank of New Zealand	G. Burgess ..	1	..	..	..	..	..	2	1	1	1	..	..	..	W. H. 0 1
Karangahake ..	Crown	Crown Gold-mining Company	2	40	..	1	..	..	2	2	1	1	1	..	..	1 0
" ..	Woodstock	Woodstock Gold-mining Company	2	40	..	1	..	..	2	2	1	1	1	..	..	1 0
" ..	Talisman	Talisman Gold-mining Company	1	20	..	2	..	..	2	2	1	1	1	..	..	1 0
Owharoa ..	Smile of Fortune	Ohinemuri Syndicate	..	15	..	2	..	..	1	2	1	..	..	..	..	1 0
Komata ..	Komata Reefs	Komata Reefs Gold-mining Company (Limited)	2	20	..	4	..	..	2	..	1	1	1	..	1	1 0
Waitekauri ..	Waitekauri	Waitekauri Gold-mining Company	2	40	..	6	3	1	4	2	1	1	1	..	..	1 0
" ..	Jubilee	Jubilee Syndicate	..	10	..	5	2	1	1	2	1	1	1	..	1	..
" ..	Golden Cross	Waitekauri Gold-mining Company	1	10	..	2	..	..	2	2	1	1	1	..	..	..
" ..	Grace Darling	Grace Darling Gold-mining Company	..	10	..	3	..	..	1	2	1	1	1	..	..	1 0
" ..	Mangakara	Reginald Smith	..	9	..	3	..	..	1	2	..	..	..	..	..	1 0
" ..	Waitekauri Extended	Waitekauri Extended Gold-mining Company	1	20	..	3	..	..	2	..	1	1	1	..	1	1 0
Waihi ..	Waihi	Waihi Gold-mining Company	2	90	..	1	..	..	3	6	1	1	2	..	1	1 0
Waikino ..	Victoria	Waihi Gold-mining Company	2	100	..	6	..	..	..	2	..	1	..	1	1	1 0
Waihi ..	Silverton	Silverton Gold-mining Company	2	40	..	2	..	..	2	2	1	1	1	..	..	1 0
<i>Piako County.</i>																
Waiorongomai ..	Te Aroha	New Zealand Exploration Company	1	10	..	2	..	..	..	1	1	1	1	..	..	1 0
City of Auckland ..	Bank of New Zealand	..	1	..	..	..	1	1	2	6	4	2	..	..	..	1 0
" ..	Stanley Street	George Fraser	..	..	1	1	2	2	2	2	1	1	..	..	1	..

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED FOR THE YEAR ENDED 31st MARCH, 1898.

Locality and Name of Mine.	Average Number of Men employed — Wages - men or Owners.	For Owners.				Estimated Value of Gold and Bullion.
		Quartz crushed.	Gold obtained.		Cyanide.	
			Amalgamation.			
GREAT BARRIER, AND COROMANDEL COUNTY.						
Great Barrier Island—						
Great Barrier .. ..	6	Tons cwt. lb. 1 16 108	Oz. dwt. 45 8	Oz. dwt. ..	£ s. d. 122 11 7	
Port Charles—						
Eva .. ..	2	1 4 97	391 19	..	1,058 5 4	
Cabbage Bay—						
Queen Victoria .. ..	2	0 0 42	2 14	..	7 12 0	
Jersey .. ..	3	8 0 20	70 6	..	205 12 6	
Sundries .. ..	4	4 0 0	10 0	..	28 0 0	
	9	12 0 60	83 0	..	241 4 6	
Kennedy Bay—						
Sundries .. ..	16	5 0 23	53 0	..	153 14 0	
Waikoromiko .. ..	2	4 10 56	25 19	..	75 5 0	

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED FOR THE YEAR ENDED  
31st MARCH, 1898—continued.

Locality and Name of Mine.	Average Number of Men employed — Wage-men or Owners.	For Owners.				Estimated Value of Gold and Bullion.
		Quartz crushed.	Gold obtained.		Cyanide.	
			Amalga- mation.			
COROMANDEL COUNTY—continued.						
Tokatea—		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.	
Royal Oak .. .. .	80	204 15 0	9,702 4	..	24,441 10 2	
Hauraki Associated .. .. .	40	370 0 0	1,345 0	..	3,800 0 0	
Tokatea Consols .. .. .	9	63 13 0	267 2	..	774 11 10	
Triumph .. .. .	4	162 0 0	11 14	..	33 12 9	
Southern Star .. .. .	6	38 15 0	15 10	..	40 7 3	
Success .. .. .	30	72 0 91	391 11	..	1,120 4 5	
Buffalo .. .. .	2	8 0 10	9 19	..	29 2 2	
Buffalo Tributars .. .. .	4	4 0 60	116 17	..	340 16 7	
	175	918 4 49	11,859 17	..	30,580 5 2	
Kapanga—						
Kapanga .. .. .	65	240 0 0	1,980 16	..	{	2,367 10 10
Tributars .. .. .	15	21 12 0				3,328 1 11
Manola .. .. .	2	0 1 0				284 11 1
Sundries .. .. .	3	0 0 20	18 10	..		53 13 0
	85	261 13 20	2,049 12	..		6,033 16 10
Kauri Block—						
Hauraki .. .. .	116	3,686 10 0	7,842 15	..		23,943 17 3
Welcome Find .. .. .	15	58 1 8	239 15	..		660 1 3
New Golconda .. .. .	5	18 0 0	60 0	..		180 0 0
Hauraki North .. .. .	17	240 17 0	173 3	..		360 15 0
Blagrove's .. .. .	38	20 2 56	44 5	..		97 10 0
Bunker's Hill .. .. .	14	21 0 0	139 5	..		410 2 4
Golden Pah .. .. .	50	48 0 30	148 1	..		453 11 9
Kathleen Crown .. .. .	41	12 0 0	12 9	..		35 3 6
Hauraki South .. .. .	15	10 0 0	9 8	..		28 0 0
	811	4,114 10 94	8,668 1	..		25,569 1 1
Tiki—						
Coromandel Freehold .. .. .	10	23 0 80	53 6	..		155 18 3
Specimen Hill .. .. .	1	0 0 32	48 15	..		144 16 6
	11	23 1 0	102 1	..		300 14 9
Kuaotunu—						
Mariposa .. .. .	47	4,740 0 0	834 8	895 2		8,777 13 8
Kapai-Vermont .. .. .	29	3,027 0 0	..	2,048 0		4,668 8 0
Great Mercury .. .. .	16	433 0 0	..	332 2		679 0 0
Irene .. .. .	10	100 0 0	27 10	15 13		81 15 3
Juno .. .. .	2	25 0 0	19 5	..		55 16 6
Waitaia .. .. .	20	0 0 95	14 19	..		40 14 9
	124	8,325 0 95	896 2	3,290 17		9,303 8 2
Mercury Bay—						
Moana .. .. .	6	0 10 0	7 10	..		21 15 2
Totals .. .. .	741	13,665 16 46	24,188 17	3,290 17		73,337 10 0

## THAMES COUNTY.

Tapu—						
Sheridan .. .. .	20	443 10 0	40 1	..	118 5 3	
Mahara Royal .. .. .	41	1,880 0 0	823 16	..	2,517 19 4	
	61	1,823 10 0	863 17	..	2,636 4 7	
Tararu—						
Tararu Creek .. .. .	25	1,970 0 0	426 0	1,995 0	2,346 0 6	
Kaiser .. .. .	4	112 0 0	88 10	..	286 7 0	
Scandinavian .. .. .	3	12 0 0	16 5	..	44 13 9	
Argosy .. .. .	6	0 4 0	23 6	..	77 0 0	
Chicago .. .. .	4	3 0 0	7 2	..	20 0 0	
	42	2,097 4 0	561 3	1,995 0	2,774 1 3	
Kuranui—						
Kuranui-Caledonian .. .. .	37	2,988 0 0	1,174 9	..	3,139 5 7	
Moanataiari—						
Moanataiari .. .. .	123	1,233 6 0	602 0	..	1,638 15 3	
Tributars .. .. .	15	101 0 0	139 14	..	377 3 10	
New Alburnia .. .. .	45	3,744 0 0	1,771 0	..	4,717 12 9	
	183	5,078 6 0	2,512 14	..	6,733 11 10	



STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED FOR THE YEAR ENDED  
31st MARCH, 1898—continued.

Locality and Name of Mine.	Average Number of Men employed or Wages-men or Owners.	For Owners.				Estimated Value of Gold and Bullion.
		Quartz crushed.	Gold obtained.		Oz. dwt.	
			Amalgamation.	Cyanide.		
THAMES COUNTY—continued.						
Grahamstown—		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.	
Victoria .. .. .	19	604 0 0	658 0	..	1,764 9 0	
Judd's (tailings) .. .. .	4	4,905 0 0	896 5	..	2,322 11 2	
Sundries .. .. .	20	200 0 0	300 0	..	785 0 0	
	43	5,109 0 0	1,849 5	..	4,872 0 2	
Waiotahi—						
Waiotahi .. .. .	16	1,360 0 0	1,981 9	..	5,227 17 3	
Nonpareil .. .. .	10	294 0 0	861 10	..	1,008 9 9	
West Coast .. .. .	2	49 0 0	47 7	..	123 3 6	
Little Maggie .. .. .	2	15 0 0	16 2	..	43 9 5	
	30	1,718 0 0	2,856 8	..	6,401 19 11	
Waiokaraka—						
May Queen .. .. .	52	859 0 0	924 1	..	2,495 7 1	
„ Tributers .. .. .	6	42 0 0	85 10	..	228 0 4	
	58	901 0 0	1,009 11	..	2,723 7 5	
Karaka—						
Adelaide .. .. .	12	358 10 0	163 17	..	478 2 6	
May Queen Extended .. .. .	8	39 0 0	44 19	..	121 7 4	
Claremont .. .. .	1	0 1 101	181 11	..	482 2 4	
Sundries .. .. .	10	220 0 0	210 0	..	541 10 0	
	31	617 11 101	600 7	..	1,623 2 2	
Una Hill—						
Occidental .. .. .	6	36 0 0	34 0	..	68 19 8	
Thames Special .. .. .	4	19 0 0	18 14	..	81 17 2	
	10	55 0 0	52 14	..	100 16 10	
Hape Creek—						
Anchor .. .. .	15	180 0 0	90 0	..	234 0 0	
Anchor Tributers .. .. .	4	23 0 26	42 10	..	113 6 8	
„ Tributaries .. .. .	10	254 0 0	325 14	..	680 17 7	
	29	457 0 26	458 4	..	1,028 4 3	
Hihi—						
Hihi .. .. .	4	5 14 0	48 16	..	145 0 0	
Totals .. .. .	528	20,850 6 15	13,482 8	..	32,177 14 0	
OHINEMURI COUNTY.						
Komata—						
Komata Rees .. .. .	104	2,380 0 0	..	10,628 4	8,018 13 1	
Karangahake—						
Crown .. .. .	210	16,989 0 0	..	20,792 10	41,120 2 2	
Woodstock .. .. .	201	11,358 15 0	216 16	52,454 0	35,656 7 0	
New Zealand Talisman .. .. .	70	4,194 0 0	..	15,225 2	13,681 7 3	
	381	32,541 15 0	216 16	88,471 12	90,457 16 5	
Waitekauri—						
Waitekauri .. .. .	320	21,700 0 0	..	46,076 0	50,528 8 11	
Grace Darling .. .. .	5	80 0 0	31 18	27 4	97 6 6	
	325	21,788 0 0	31 18	46,103 4	50,625 15 5	
Waihi—						
Waihi .. .. .	500	37,164 0 0	..	120,001 0	134,553 8 9	
Waihi-Silverton .. .. .	70	11,253 0 0	..	8,400 0	16,452 4 0	
	570	48,417 0 0	..	128,401 0	151,005 12 9	
Totals .. .. .	1,480	105,126 15 0	248 14	280,460 0	300,107 17 3	

## COMPARATIVE STATEMENT SHOWING INCREASE OR DECREASE OF RETURNS FOR YEARS 1896-97 AND 1897-98.

Locality.	1896-97.				1897-98.				Gold or Bullion—Increase or Decrease.	Estimated Increase or Decrease in Value.
	Number of Wages-men and Tributers employed.	Quantity of Quartz and Mullock crushed and Tailings treated.	Yield of Gold or Bullion.	Estimated Value of Gold or Bullion.	Number of Wages-men and Tributers employed.	Quantity of Quartz and Mullock crushed and Tailings treated.	Yield of Gold or Bullion.	Estimated Value of Gold or Bullion.		
Great Barrier Is.	6	Tons. 3½	Os. dwt. 219 0	£ s. d. 36 14 6	6	Tons cwt. lb. 1 16 108	Os. dwt. 45 8	£ s. d. 122 11 7	Os. dwt. -179 12	£ s. d. +85 17 1

## SUB-DISTRICTS OF COROMANDEL COUNTY.

Port Charles ..	..	..	..	..	2	1 4 97	391 19	1,058 5 4	+391 19	+1,058 5 4
Kennedy Bay ..	..	..	..	..	16	5 0 23	53 0	153 14 0	+53 0	+153 14 0
Tokatea ..	139	590	1,090 17	2,991 9 0	175	918 4 49	11,859 17	30,580 5 2	+10,769 0	+27,588 16 1
Cabbage Bay ..	15	22	186 5	377 12 2	9	12 0 60	83 0	241 4 6	-53 5	-136 7 8
Waikoromiko ..	19	9	1,058 3	3,114 15 0	2	4 10 56	25 19	75 5 0	-1,027 4	-3,089 10 9
Kapanga ..	136	965	787 17	2,258 9 5	85	261 13 20	2,049 12	6,033 16 10	+1,261 15	+3,775 7 3
Pukemaukuku ..	8	50	33 15	94 10 0	..	..	..	..	-33 15	-94 10 0
Kauri Block ..	275	4,617	25,487 5	78,309 10 3	311	4,114 10 94	8,668 1	25,569 1 1	-16,819 4	-52,740 9 2
Tiki ..	5	1	35 0	94 11 11	11	23 1 0	102 1	300 14 9	+67 1	+206 9 10
Manaia ..	4	17	8 3	11 2 7	..	..	..	..	-3 3	-11 2 7
Whangapoua ..	6	53	16 11	46 4 0	..	..	..	..	-16 11	-46 4 0
Kuaotunu ..	143	12,524	7,242 14	13,612 16 6	124	8,325 0 95	4,186 19	9,303 8 2	-3,055 15	-4,309 8 4
Mercury Bay ..	..	..	..	..	6	0 10 0	7 10	21 15 2	+7 10	+21 15 2
Totals ..	750	18,848	35,886 10	100,911 0 10	741	13,665 16 46	27,427 18	73,337 10 0	-8,456 12	-27,573 10 3

## SUB-DISTRICTS OF THAMES COUNTY.

Mata ..	..	..	..	..	..	..	..	..	..	..
Tapu ..	31	238	211 12	634 16 0	61	1,823 10 0	863 17	2,636 4 7	+652 5	+2,001 8 7
Waiomo ..	4	50	29 12	95 14 4	..	..	..	..	-29 12	-95 14 4
Puru ..	11	12	6 14	19 7 0	..	..	..	..	-6 14	-19 7 0
Tararu ..	86	5,485	2,271 17	3,877 10 3	42	2,097 4 0	2,556 3	2,774 1 3	+284 6	+1,102 17 3
Kuranui ..	74	399	601 15	1,634 8 7	37	2,988 0 0	1,174 9	3,139 5 7	+572 14	+1,560 9 1
Moanatalari ..	154	7,616	3,071 11	8,094 0 11	183	5,078 6 0	2,512 14	6,733 11 10	-558 17	-1,643 8 4
Grahamstown ..	70	6,989	3,059 11	8,515 8 6	43	5,109 0 0	1,849 5	4,872 0 2	-1,219 6	-1,067 1 4
Waiohahi ..	69	5,206	2,759 18	7,489 1 3	30	1,718 0 0	2,356 8	6,401 19 11	-403 10	+1,190 1 11
Waiohakaraka ..	36	638	578 12	1,533 5 6	58	901 0 0	1,009 11	2,723 7 5	+430 1	+30 18 4
Karaka ..	33	230	565 6	1,592 3 10	31	617 11 101	600 7	1,623 2 2	+2 11	-593 15 6
Una Hill and Te Papa ..	14	159	257 5	693 12 4	10	55 0 0	52 14	100 16 10	-	-
Hape Creek ..	6	27	22 12	63 5 7	29	457 0 26	458 4	1,028 4 3	+435 12	+964 18 8
Puriri ..	6	11	4 2	10 19 11	..	..	..	..	-4 2	-10 19 11
Hibi ..	..	..	..	..	4	5 14 0	48 16	145 0 0	+48 16	+145 0 0
Totals ..	594	27,060	13,440 7	34,253 14 0	528	20,850 6 15	13,482 8	32,177 4 0	+42 1	2,076 0 0

## SUB-DISTRICTS OF OHINEMURI COUNTY.

Maratoto ..	6	1	79 0	23 0 9	..	..	..	..	-79 0	-23 0 9
Karangahake ..	244	10,717	18,091 0	34,878 19 0	481	32,541 15	0 88,688 8	50,625 15 5	+76,597 8	+55,578 17
Owharoa ..	..	..	..	..	..	..	..	..	..	..
Waitekauri ..	357	11,413	30,244 0	32,676 3 6	325	21,788 0	0 46,023 4	8,018 13 1	+10,628 4	+8,018 13 1
Komata ..	..	..	..	..	104	2,380 0	135,257 0	151,005 12 9	+35,045 0	+515 16 3
Waihi ..	411	44,854	100,212 0	150,489 16 6	570	48,417 0	..	..	..	..
Totals ..	1,018	66,985	148,626 0	218,067 19 9	1,480	82,626 15	0 280,708 14	300,107 17 8	+132,082 14	+82,039 17 1

COMPARATIVE STATEMENT of RETURN for HAURAKI DISTRICT for the Years ended 31st March, 1897 and 1898, respectively.

Name of County.	Average Number of Men employed.		For Owners.				For Tributaries.				Tallings.			Estimated Value of Gold and Bullion.
	Wages men or Owners.	Tributers.	Quarts crushed.	Mullock crushed.	Gold obtained.		Quarts crushed.	Mullock or Gravel.	Gold obtained.		Quantity treated.	Gold obtained.		
					Amalgamation.	Cyanide.			Amalgamation.	Cyanide.				
		Tons cwt. lb.	Tons.	Oz. dwt.	Oz. dwt.	Tons cwt. lb.	Tons.	Oz. dwt.	Oz. dwt.	Tons cwt.	Oz. dwt.	Oz. dwt.	£ s. d.	
..	750	18,748 5 48	..	31,698 19	4,147 11	681 0 0	..	579 18	..	11,867 0	1,215 10	40 0	100,911 0 10	
..	572	22 15,012 15 50	..	10,219 5	29 12	..	..	..	..	2,522 0	..	..	84,258 14 0	
..	1,018	64,463 4 0	..	90 19	148,535 9	..	..	..	..	..	..	..	218,067 19 9	
..	32	934 0 0	..	28 0	348 0	..	..	..	..	..	..	..	986 10 0	
..	6	3 5 0	..	219 0	..	..	..	..	..	..	..	..	36 14 6	
Totals	2,978	22 99,161 9 98	..	42,256 3	153,060 12	681 0 0	..	579 18	..	13,889 0	1,896 2	1,255 10	854,255 19 1	

12—C. 3.

1898.

Name of County.	Average Number of Men employed : Wages-men or Owners.	For Owners.			Estimated Value of Gold and Bullion.						
		Quarts crushed.	Gold obtained.								
			Amalgamation.	Cyanide.							
Tons	cwt.	lb.	Oz.	dwt.	Oz.	dwt.	£	s.	d.		
Great Barrier ..	6	1	16	108	45	8	..	132	11	7	
Coromandel ..	741	18,665	16	46	24,137	1	3,290	17	78,397	10	0
Thames ..	528	20,850	6	15	11,487	8	1,935	0	32,177	14	0
Ohinemuri ..	1,480	105,126	15	0	248	14	280,460	0	300,107	17	8
Totals	*2,755	189,644	14	57	85,918	11	285,745	17	405,745	18	3

**Gold or Bullion.**  
**Oz. dwt.**

[illegible]

**NOTE.**-- In the above return, gold to the value of £4,387 9s. 4d. was obtained by tributers, upwards of fifty men being employed.

\* Number employed in gold-producing mines.

+ Of this, \$305,863 has been obtained by the cyanide process.

## WAIHI GOLD-MINING COMPANY.

The following table shows the returns from this famous mine since 1890 :—

		Tons.	£	s.	d.
1890	...	...	21,112	13	6
1891	...	...	23,935	5	11
1892	...	...	18,236	44,888	2 4
1893	...	...	19,805	61,900	10 11
1894	...	...	24,864	82,827	2 2
1895	...	...	35,765	120,334	2 2
1896	...	...	36,937	137,321	8 2
1897	...	...	40,768	144,040	9 7
Period ending 31st January, 1898	...	...	...	...	...
Period ending 28th February, 1898	...	3,930	14,688	5	6
Period ending 31st March, 1898	...	2,880	11,241	3	5
		183,185	£662,289	3	8

Twenty dividends, seven of 1s. and thirteen of 2s. per share, have been declared by the company on 160,000 shares, and the total amount of dividends paid has been £260,500.

It will be seen from the foregoing returns and comparative results that in the Coromandel County the decrease in the yield of gold has been considerable. The Hauraki Mine has not turned out rich gold in such quantities as were obtained during the past two years.

In the Kuaotunu district the falling-off in the returns from the chief mines has also been very great.

In the Thames County and Borough there has been a general decrease throughout.

In the Ohinemuri district the Waihi and Waihi-Silverton have maintained returns equal to those of last year, whilst the Waitekauri Mine returns show an increase. The Komata Reefs Mine has become an important factor in gold-production, and has added considerably to the returns. At Karangahake the New Zealand Talisman and Crown Mines show a decided increase, and the Woodstock Mine, which did not give any returns the previous year, has furnished a large addition to the yield of the present period.

Notwithstanding the falling-off in Coromandel district, and the many disappointments that have been experienced in those claims more recently taken up, there are still hopes of ultimate success and recurrence of rich yields. In the Tokatea district the Royal Oak Mine shows substantial returns, and other claims are so far developed as to be assured of future profitable crushings. The extensive works undertaken in Whangapoua district by the Kauri Freehold Gold Estates Company and the prosecution of deep-level mining at Kuaotunu both point to future success in those parts of the district.

In the Thames district the Mahara Royal Mine, at Tapu Creek, is furnishing steady yields of a profitable character. At Tararu the Tararu Creek Company intend to restore their crushing plant, and hope to be in a better position to deal with the ores found in their mines. Within the Borough of Thames the prospecting works at the deep levels in the Kuranui-Caledonian and Moanataiari Mines will still further open up the reefs in those claims. This locality is famous for rich deposits, and whilst work is being done in favourable country there is always a strong probability of one of those bonanzas being discovered. The owners of the May Queen Mine will shortly be in a position to operate on the low levels, to which access can be had as soon as the drainage of the ground is effected by the pumps in the Queen of Beauty shaft. There are promising reefs in the Thames-Hauraki Goldfields property, running through country that can be drained shortly after a commencement is made to pump water. One of the most valuable portions of this mine will probably be found to exist in the blocks hitherto untried, and lying at no great depth from the surface, which may be worked during the time that the shaft is being extended to reach a level deeper than any of those dealt with.

In the Ohinemuri district operations in the chief mines have shown that the runs of payable quartz continue to the deepest levels opened, and fully warrant the expectation of increased yields of gold in the future. The lowest levels in the three mines at Karangahake—the Crown, Woodstock, and Talisman—contain quartz of high quality. At Waitekauri and Komata the levels opened show blocks of payable stone, and at Waihi the progressive works in the low levels show that large and rich reefs extend downwards. The Waihi Grand Junction Mine, which adjoins the Waihi, promises at an early date to become a gold-producing property, the well-known reefs of the Waihi Mine having been explored in the ground, and found to contain quartz of a valuable character.

On the whole, it may be said that, although the "boom" in quartz-mining has passed away and many claims have been abandoned, the prospects in the mines that have been legitimately worked are such as to warrant hopes of a large increase in the yield of gold from the Hauraki district.

## MIDDLE ISLAND.

## NELSON AND WEST COAST DISTRICTS.

The following list of claims taken up will show the great interest taken in quartz-mining. Prospecting work has been carried on in some of the claims, but the greater number have been neglected. The new machinery erected during the year will permit of a large tonnage of quartz being dealt with by the owners of the Reefton claims.

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Havelock.</i>						
6/3/88	A. 225 B. 2 P. 0	Endeavour Inlet	..	..	Star ..	Star Antimony Co. (Ltd.).
6/8/88	287 0 0	"	..	..	" ..	"
6/8/88	300 0 0	"	..	..	" ..	"
1/1/92	30 0 0	Waikakaho ..	..	..	Southern Cross ..	David Girdwood.
1/10/94	30 0 0	"	..	..	Captain Cook No. 1 ..	Robert Ewing.
30/6/94	30 0 0	Wakamarina ..	..	Wakamarina	Empire City ..	Golden Bar Gold-mining Co.
13/11/95	8 2 15	"	..	..	Federation Extd. ..	Walter J. Hunt.
13/11/95	24 2 21	"	..	..	Great Yorkshire ..	"
1/10/95	2 0 0	"	..	..	(Machine-site) ..	Robert Ewing.
30/7/96	20 1 0	Waikakaho ..	..	..	Captain Cook No. 2 ..	"
28/9/96	30 0 0	"	..	..	Mahakipawa ..	Ravenscliff Quartz-mining Co.
28/9/96	30 0 0	"	..	..	Jubilee ..	"
28/9/96	30 0 0	"	..	..	Kapai ..	"
28/9/96	30 0 0	"	..	..	Lucky Hit ..	"
28/9/96	30 0 0	"	..	..	Waikakaho ..	"
25/11/96	18 1 8	Wakamarina ..	..	..	Golden Bar ..	Golden Bar Gold-mining Co.
31/12/96	25 3 0	Waikakaho ..	..	..	Silence ..	M. B. Elder.
<i>Collingwood.</i>						
3/3/87	16 2 0	Bedstead Gully	VIII.	Aorere ..	..	Johnston's United Mining Co.
5/7/88	6 3 34	"	"	"	..	"
28/10/95	28 3 29	Cole's Gully ..	"	"	..	John Tyler.
6/10/96	16 0 0	Onakaka ..	II.	Waitapu ..	..	I. S. M. Jacobsen.
11/1/97	30 0 0	Cole's Gully ..	VIII.	Aorere ..	..	Charles Pilliet.
12/8/97	19 0 0	Boulder River..	X.	"	..	J. Taylor and others.
1/3/97	95 2 0	Cole's Gully ..	VIII.	"	..	James B. Gilbert.
29/3/97	100 0 0	"	"	"	..	D. C. Tana.
21/7/97	38 3 18	"	"	"	..	Josiah Corby.
17/2/98	62 3 0	Richmond Hill	IV.	"	..	Graham Fisher.
<i>Lyell.</i>						
16/1/96	57 3 2	Lyell Creek ..	XIII.	Lyell ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
7/7/96	100 0 0	Alpine Range..	"	"	Kent Quartz-mining Co. (Ltd.).	Nicola Ocace.
7/7/96	100 0 0	"	"	"	Middlesex ..	Middlesex Gold-mining Co.
7/7/96	100 0 0	New Creek ..	"	"	Surrey Quartz-mining Co.	James Welman.
25/7/92	76 0 4	Alpine Range..	"	"	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
17/2/97	50 0 0	Lyell Creek ..	I.	Maruia ..	Golden Crown ..	James Grieve.
19/8/97	49 1 0	Alpine Range..	XIII.	Lyell ..	Irishman's Creek ..	Charles Jacobs and William Green.
22/5/96	8 1 24	"	"	"	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
17/2/97	12 2 0	"	"	"	"	Ditto.
17/2/97	30 0 0	Lyell Creek ..	I.	Maruia ..	No. 2 Alpine Quartz-mining Co.	Charles H. Junker and Edward Morris.
14/3/92	16 0 20	"	"	"	Cresus Quartz-mining Co.	John Kelly, James Edge, and William P. Smith.
13/11/93	28 2 16	Eight-mile ..	XIII.	Lyell ..	United Italy ..	United Italy Quartz-mining Co. (Ltd.).
13/11/93	22 1 28	"	"	"	Tyrconnel Quartz-mining Co.	James Edge and John Kelly.
<i>Westport.</i>						
13/7/96	99 3 39	Stony Creek, Waimangaroa	X.	Ngakawau..	Britannia Gold-mining Co.	James Gardner and party.
13/7/96	100 0 0	Ditto	"	"	Welcome Co. ..	Walter Williams and S. Roche.
23/12/96	100 0 0	Seatonville ..	XIII.	Maruia ..	Lady Agnes Gold-mining Co.	George Walker and party.
4/1/97	97 1 10	Waimangaroa..	VI.	Kawatiri ..	Beaconsfield Gold-mining Co.	Charles Lempfert.
15/1/95	30 0 0	Seatonville ..	IX.	Maruia ..	Swanston ..	The Swanston Gold-mining Co. (Ltd.).
<i>Reefton.</i>						
28/6/93	73 0 19	Merrijigs ..	VI.	Waitahu ..	Golden Lead ..	Golden Lead Mining Co.
23/5/95	89 1 16	Devil's Creek ..	II.	"	Progress ..	Progress Gold-mining Co.
19/8/95	31 0 23	"	"	"	Progressive ..	Consolidated Goldfields of New Zealand (Ltd.).
1/11/95	100 0 0	Murray Creek..	XIV.	Reefton ..	Gladstone ..	Ditto.
1/11/95	100 0 0	"	"	"	Beaconsfield ..	"
1/11/95	100 0 0	Devil's Creek ..	II.	Waitahu ..	Larnach ..	"
1/11/95	100 0 0	Rainy Creek ..	"	"	Carbine ..	Inkerman Combined Gold-mines (Ltd.).
1/11/95	57 2 0	"	"	"	Revival ..	"
16/9/95	39 0 24	Crushington ..	XIV.	"	Lankey's Creek ..	James Scarlett.
6/1/96	33 0 0	Rainy Creek ..	II.	"	Revival ..	Inkerman Combined Gold-mines (Ltd.).
25/11/95	100 0 0	Larry's Creek..	VII.	Reefton ..	Oaledonia ..	Consolidated Goldfields of New Zealand (Ltd.).
25/11/95	100 0 0	"	"	"	Rosebery ..	Ditto.

**ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices—continued.**

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Reefton—continued.</i>						
6/1/96	100 0 0	Boatman's ..	XI.	Reefton ..	Seddon ..	Consolidated Goldfields of New Zealand (Ltd.).
25/11/95	100 0 0				Cadman ..	Ditto.
25/11/95	96 1 10	Big River ..	VI.	Waitahu ..	Pattolus ..	Bernard P. McMahon.
19/8/95	80 0 0		X.		Canterbury ..	George J. Black.
6/1/96	100 0 0	Boatman's ..	XI.	Reefton ..	Carnot ..	W. McArthur.
6/1/96	33 2 2	" ..	"	"	Pasteur ..	T. Hubert Lee.
1/5/96	100 0 0	" ..	"	"	Trial ..	Alexander McKensie.
20/3/96	100 0 0	Painkiller ..	X.	"	Tasmania ..	Matthew Wynn.
1/5/96	100 0 0	Devil's Creek ..	II.	Waitahu ..	Carroll ..	G. H. Boyd.
1/5/96	50 0 0	Painkiller ..	XIV.	Reefton ..	Munster ..	Joseph McHugh.
6/3/96	60 3 20	Crushington ..	"	"	Empire ..	J. Scarlett.
1/5/96	99 3 26	Devil's Creek ..	II.	Waitahu ..	African ..	M. J. Hughes.
1/5/96	100 0 0	Painkiller ..	"	"	Jamieson ..	William Fisk.
2/6/96	100 0 0	Devil's Creek ..	"	"	Ballance ..	G. H. Boyd.
2/6/96	100 0 0	Murray Creek ..	XIV.	Reefton ..	Salisbury ..	Consolidated Goldfields of New Zealand (Ltd.).
2/6/96	49 2 0		"	"	June ..	George H. Boyd.
2/6/96	100 0 0	Boatman's ..	XI.	"	Blake ..	
2/6/96	100 0 0	Devil's Creek ..	II.	Waitahu ..	Rose ..	David Ziman.
2/6/96	100 0 0	Rainy Creek ..	"	"	Radiometer ..	William McArthur.
2/6/96	100 0 0	Snowy River ..	X.	"	Matthias ..	H. F. Doogan.
2/6/96	100 0 0	" ..	"	"	Wolseley ..	"
2/6/96	86 0 10	" ..	"	"	Nelson ..	"
2/6/96	50 0 21	" ..	"	"	Leighton ..	Morris Levy.
2/6/96	100 0 0	Merrijigs ..	VI.	"	Waterloo ..	Thomas H. Lee.
2/6/96	100 0 0	Devil's Creek ..	XIII.	"	Delta ..	H. G. Hankin.
2/6/96	100 0 0	Boatman's ..	XI.	Reefton ..	Messena ..	T. Hubert Lee.
2/6/96	100 0 0	Devil's Creek ..	II.	Waitahu ..	Lady Mary ..	W. Irving.
2/6/96	99 3 11	Murray Creek ..	XIV.	Reefton ..	Ajax ..	John Trennery.
2/6/96	100 0 0	Crushington ..	"	"	Crushington ..	G. B. Shepherd.
2/6/96	59 3 30	Big River ..	VI.	Waitahu ..	Alert ..	James F. Clark.
2/6/96	99 3 16	Painkiller ..	XI.	Reefton ..	Connaught ..	Edward Black.
3/8/96	46 3 6	Boatman's ..	"	"	Chamberlain ..	William Fisk.
20/7/96	65 0 0	Larry's Creek ..	VII.	"	Kismet ..	R. S. Hindmarsh.
20/7/96	50 0 0	" ..	"	"	Broadway ..	G. J. Willis.
20/7/96	100 0 0	Crushington ..	XIV.	"	Dunedin ..	T. Hubert Lee.
20/7/96	64 3 0	Black's Point ..	"	"	London ..	"
21/9/96	55 0 0	Merrijigs ..	VI.	Waitahu ..	Al ..	A1 Gold-mining Co.
21/9/96	67 0 0	Murray Creek ..	XIV.	Reefton ..	Golden Treasure Extd.	Golden Treasure Extended Co.
7/9/96	50 0 0	" ..	XV.	"	Union Jack ..	John Knight.
7/9/96	100 0 0	Burke's Creek ..	XIV.	"	Jupiter ..	Patrick Butler.
21/9/96	85 3 24	Devil's Creek ..	XIII.	"	Revival ..	Peter McHugh.
21/9/96	51 0 0	Rainy Creek ..	II.	Waitahu ..	Clarence ..	C. Kirkpatrick.
7/9/96	99 3 0	Boatman's ..	VII.	Reefton ..	Transvaal ..	T. Hubert Lee.
21/9/96	46 1 35	Big River ..	X.	Waitahu ..	Prima Donna ..	B. P. McMahon.
7/9/96	96 2 7	Boatman's ..	VII.	Reefton ..	Holyhead ..	"
21/9/96	100 0 0	" ..	"	"	Anthony Gibbs ..	John Williams.
5/11/96	98 3 6	Devil's Creek ..	II.	Waitahu ..	Deep ..	Consolidated Goldfields of New Zealand (Ltd.).
21/9/96	99 2 0	Murray Creek ..	XIV.	Reefton ..	Royal ..	Ditto.
21/9/96	54 0 0	" ..	"	"	Energetic ..	"
21/9/96	95 0 0	" ..	"	"	Golden Fleece ..	"
16/11/96	100 0 0	Big River ..	VI.	Waitahu ..	Mount Aurum ..	A. McCloy.
10/12/96	49 3 15	Merrijigs ..	II.	"	Louisa ..	Walter Irving.
10/12/96	99 0 9	Rainy Creek ..	"	"	Wilson ..	George G. Dixon.
26/11/96	100 0 0	Snowy River ..	XIII.	"	Snowy River ..	J. Scarlett.
26/11/96	100 0 0	" ..	"	"	Rob Roy ..	J. Cohen.
6/7/96	100 0 0	Merrijigs ..	II.	"	Sir F. Drake ..	T. Hubert Lee.
5/11/96	34 2 15	Murray Creek ..	XIV.	Reefton ..	North Ajax ..	James Stevenson.
15/10/96	62 3 15	Big River ..	X.	Waitahu ..	No. 2 Big River ..	J. S. Wilson.
5/11/96	87 2 37	" ..	"	"	Mawhera ..	H. F. Doogan.
10/12/96	77 1 25	Murray Creek ..	XIV.	Reefton ..	North Star ..	A. Campbell.
26/11/96	100 0 0	Landing Creek ..	XIII.	Inangahua ..	Magnolia ..	J. G. Willis.
26/11/96	99 2 0	Boatman's ..	XI.	Reefton ..	Sheba ..	J. McTaggart.
7/1/97	100 0 0	Snowy River ..	XIII.	Waitahu ..	Kiwi ..	Bernard Duffy.
19/3/97	29 3 22	Victoria Range ..	XVI.	Reefton ..	Big Reef ..	G. J. Willis.
4/2/97	29 3 20	" ..	XII.	"	Earl Brassey ..	Percy N. Kingswell.
4/2/97	29 3 20	" ..	XVI.	"	Kirwan's Reward ..	"
4/2/97	29 3 31	" ..	XII.	"	Lady Brassey ..	"
4/2/97	93 2 4	" ..	XVI.	"	Lord Brassey ..	"
19/3/97	30 0 0	" ..	"	"	Luck's Way ..	George Walker.
15/4/97	53 0 0	Boatman's ..	XI.	"	Paris ..	T. Hubert Lee.
4/6/97	60 0 0	" ..	"	"	Fiery Cross ..	Consolidated Goldfields of New Zealand.
4/6/97	86 0 0	Larry's ..	VII.	"	Duffy ..	Charles Clifford.
23/10/97	100 0 0	Painkiller ..	X.	"	Ulster ..	George Black.
19/11/97	100 0 0	" ..	XIV.	"	Lord Ranfurly ..	Timothy O'Neil.
5/11/97	100 0 0	Murray Creek ..	"	"	Mountaineer ..	James Osborne.
5/11/97	100 0 0	" ..	"	"	City of Belfast ..	William Patterson.
23/12/97	63 1 13	Crushington ..	"	"	Wealth of Nations ..	David Ziman.
7/1/98	99 1 0	Boatman's ..	XI.	"	Golden Apple ..	Thomas Naysmith.
17/12/97	98 0 0	Larry's Creek ..	VII.	"	Lord Rosebery Extd.	Charles Clifford.
7/1/98	100 0 0	Crushington ..	II.	Waitahu ..	New Globe ..	"

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Reefton—continued.</i>						
<i>Under "Mines Act, 1877."</i>						
4/7/84	A. 34 3 38	Crushington ..	XIV.	Reefton ..	Keep-it-Dark ..	Keep-it-Dark Gold-mining Co.
6/6/84	102 2 38	Black's Point..	"	" ..	New Low-level Tunnel ..	Consolidated Goldfields of New Zealand (Ltd.).
7/9/87	37 3 0	Big River ..	X.	Waitahu ..	Big River ..	Big River Gold-mining Co.
17/10/83	23 0 36	Boatman's ..	XI.	Reefton ..	Eureka ..	Welcome Gold-mining Co.
5/12/82	52 2 12	Devil's Creek ..	II.	Waitahu ..	Globe ..	David Ziman.
26/11/96	36 3 0	Landing Creek	IX.	Inangahua	Coal Creek ..	W. Duffy.
<i>Gold-mining Leases (Quartz).</i>						
6/7/86	13 2 30	Devil's Creek ..	II.	Waitahu ..	Globe Co. ..	David Ziman.
28/9/86	15 3 33	" ..	"	" ..	" ..	"
4/10/86	5 0 0	" ..	"	" ..	" ..	"
1/11/86	16 1 87	Crushington ..	XIV.	Reefton ..	Hercules ..	Hercules Gold-mining Co.
1/7/83	2 2 20	" ..	"	" ..	No. 2 South Keep-it-Dark ..	Keep-it-Dark Gold-Mining Co.
1/2/83	16 1 27	" ..	"	" ..	Ditto ..	"
<i>Gold-mining Leases (Alluvial).</i>						
1/7/84	9 2 25	" ..	VI.	Waitahu ..	Merrijigs sluicing..	William King.
<i>Reefton (Inangahua District).</i>						
18/4/88	30 0 0	Merrijigs ..	VI.	Waitahu ..	Cumberland ..	W. Irving.
29/5/90	30 0 0	Painkiller ..	X.	Reefton ..	Dillon Extended ..	Dillon Extended Gold-mining Co.
28/10/91	10 0 0	Merrijigs ..	VI.	Waitahu ..	Cumberland ..	Cumberland Gold-mining Co.
1/6/92	28 2 25	Crushington ..	XIV.	Reefton ..	No. 2 South Keep-it-Dark ..	Keep-it-Dark Gold-mining Co.
27/9/93	13 1 1	Merrijigs ..	VI.	Waitahu ..	Central ..	James Thorburn.
25/1/93	16 0 26	Boatman's ..	XI.	Reefton ..	Welcome ..	Welcome Gold-mining Co.
17/8/94	21 1 36	Crushington ..	XIV.	" ..	Keep-it-Dark ..	Keep-it-Dark Gold-mining Co.
17/8/94	16 2 0	" ..	"	" ..	Hercules ..	Hercules Gold-mining Co.
5/10/94	28 2 8	Boatman's ..	XI.	" ..	Welcome ..	Welcome Gold-mining Co.
17/6/95	30 0 0	Big River ..	X.	Waitahu ..	St. George ..	St. George Gold-mining Co.
29/6/95	16 2 6	" ..	"	" ..	Lord Edward ..	Lord Edward Gold-mining Co.
19/8/95	30 0 0	Merrijigs ..	VI.	" ..	Durham II. ..	Matthew Wynn.
16/9/95	30 0 0	Big River ..	X.	" ..	Star ..	John Trennery.
4/10/95	28 3 0	Merrijigs ..	VI.	" ..	Cumberland ..	Cumberland Gold-mining Co.
4/10/95	29 3 36	" ..	"	" ..	" ..	"
1/11/95	15 3 21	" ..	"	" ..	Mariners ..	Walter Irving.
25/11/95	16 2 0	Boatman's ..	VII.	Reefton ..	Golden Arch ..	Francis Rogers.
25/11/95	16 2 4	" ..	"	" ..	Golden Crown ..	John Williams.
1/11/95	16 0 21	Rainy Creek ..	II.	Waitahu ..	Carbine ..	Inkerman Combined Gold-mines (Ltd.).
27/1/96	16 2 4	Merrijigs ..	VI.	" ..	Exchange ..	Exchange Gold-mining Co.
19/2/96	30 0 0	Painkiller ..	X.	Reefton ..	Dillon Extended ..	Dillon Extended Gold-mining Co.
10/4/96	29 2 25	" ..	"	" ..	Painkiller ..	Thomas McGrath.
10/4/96	16 2 0	Boatman's ..	VII.	" ..	Ziman ..	Bernard Rogers.
2/6/96	22 1 7	Painkiller ..	X.	" ..	Killarney ..	Anton C. Kater.
2/6/96	29 1 11	Murray Creek..	XIV.	" ..	Percival ..	David Ziman.
2/6/96	14 3 29	" ..	XV.	" ..	Southern Cross ..	John G. Willis.
2/6/96	6 8 22	Rainy Creek ..	II.	Waitahu ..	Zenith ..	George J. Willis.
2/6/96	30 0 0	Murray Creek..	XIV.	Reefton ..	Victoria Extended..	William J. Collins.
2/6/96	5 8 32	Painkiller ..	"	" ..	Micawber ..	Joseph Walsh.
2/6/96	30 0 0	Big River ..	X.	Waitahu ..	Break o' Day ..	Harman J. Reeves.
20/7/96	30 0 0	Crushington ..	XIV.	Reefton ..	Mariner ..	John S. Treloar.
17/8/96	16 2 0	Boatman's ..	VII.	" ..	Westralian ..	Charles W. Martin.
21/9/96	30 0 0	Big River ..	X.	Waitahu ..	New Alexander ..	Thomas J. Malloy.
15/10/96	16 3 0	Painkiller ..	"	Reefton ..	Triangle ..	George J. Willis.
5/11/96	24 1 30	Merrijigs ..	II.	Waitahu ..	Maritana..	Charles Anderson.
5/11/96	22 3 20	Devil's Creek ..	"	" ..	Wedge ..	Consolidated Goldfields of New Zealand (Ltd.).
26/11/96	9 2 8	Merrijigs ..	"	" ..	Elliston ..	Thomas H. Lee.
18/2/96	29 3 35	" ..	VI.	Reefton ..	Primrose ..	James F. Clark.
19/3/96	29 3 11	Victoria Range	"	" ..	Young New Zealand	Henry Smith.
19/3/96	29 3 37	" ..	"	" ..	Lord Nelson ..	Frederick A. G. Archer.
19/3/97	30 0 0	" ..	"	" ..	Morgan ..	James Woolhouse.
19/3/97	28 3 26	" ..	"	" ..	Lady Agnes ..	George J. Willis.
19/3/97	30 0 0	" ..	"	" ..	Lucky ..	Edward Silcock.
19/3/97	30 0 0	" ..	"	" ..	El Dorado ..	Kenneth B. McIver.
19/3/97	30 0 0	" ..	"	" ..	Mutual ..	"
19/3/97	30 0 0	" ..	XII.	" ..	Holy Terror ..	William G. Collings.
19/3/97	29 3 30	" ..	"	" ..	Golden Pebble ..	Charles Williams.
19/3/97	29 3 30	" ..	XVI.	" ..	Aide-de-camp ..	Boatman's Exploration Gold-mining Co.
19/3/97	30 0 0	" ..	XII.	" ..	Hidden Mystery ..	Edward Silcock.
19/3/97	29 3 30	" ..	"	" ..	Governor ..	Boatman's Exploration Gold-min Co.
19/3/97	15 3 0	" ..	XVI.	" ..	City of Derry ..	John McLaughlin.
19/3/97	29 3 37	" ..	"	" ..	Napier ..	George G. Dixon.
19/3/97	17 0 31	" ..	"	" ..	Lady Antrim ..	George J. Black.
19/3/97	29 3 37	" ..	"	" ..	Waitahu ..	Morris Levy.
19/3/97	29 3 22	" ..	XII.	" ..	Newhaven ..	Michael J. Hughes.
15/4/97	26 1 17	" ..	XVI.	" ..	Ivanhoe ..	Walter Irving.



ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LICENSES, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Reefton (Inangahua District)—continued.</i>						
23/4/97	A. R. P. 5 3 10	Victoria Range	XII.	Reefton ..	Surplus ..	Boatman's Exploration Gold-mining Co.
7/5/97	28 2 24	"	"	" ..	Colonial Company ..	John H. Howell.
21/5/97	30 0 0	"	"	" ..	Mark Twain ..	George Walker.
21/5/97	14 1 21	"	XVI.	" ..	Mount Victoria ..	George Wells.
18/6/97	6 3 35	"	XII.	" ..	Bret Harte ..	George Walker.
18/6/97	30 0 0	"	"	" ..	Emancipator ..	Frank Payne.
18/6/97	27 2 20	"	"	" ..	Lord Glasgow ..	Boatman's Exploration Gold-mining Co.
9/7/97	29 3 36	"	"	" ..	Ben Tillett ..	William McArthur.
8/10/97	27 0 30	Devil's Creek ..	II.	Waitahu ..	Prince ..	John Dick.
5/11/97	19 1 0	Victoria Range	XII.	Reefton ..	Artemus Ward ..	William R. Free.
23/10/97	9 2 10	"	"	" ..	Sam Slick ..	George Walker.
23/10/97	16 1 0	Boatman's ..	XI.	" ..	West Welcome ..	Charles Clifford.
19/11/97	15 0 0	Victoria Range	XII.	" ..	Pilgrim ..	William R. Free.
19/11/97	29 3 20	"	"	" ..	Joker ..	George Walker.
10/12/97	29 3 0	Devil's Creek ..	II.	Waitahu ..	Queen ..	John Dick.
10/12/97	30 0 0	"	"	" ..	Record ..	Patrick Cunningham.
18/2/98	30 0 0	Merrijigs ..	VI.	" ..	Last Chance ..	James Morris.
<i>Alluvial.</i>						
8/8/96	29 2 21	Boatman's ..	VI.	Reefton ..	A1 Sluicing Co. ..	James Cornwall.
21/9/96	12 0 0	" ..	"	" ..	Flowers Creek ..	Tong Shay.
10/12/96	30 0 0	" ..	"	" ..	A1 Sluicing Co. ..	Walter Irving.
<i>Ahaura.</i>						
27/4/96	100 0 0	"	X.	Waiwhero ..	Moonlight Gold-mining Co.	Richard Devereux, Hugh Magill, Robert Mitchell, and ten others.
22/6/96	100 0 0	"	"	" ..	Ballarat Gold-mining Co.	Thomas Williams.
22/6/96	100 0 0	"	XIV.	" ..	Ceresus ..	Henry Neilson and twelve others.
27/7/96	100 0 0	"	X.	" ..	Moonlight ..	John Hubertson and eight others.
22/6/96	95 3 17	"	XIV.	" ..	Minerva ..	Gerald Perotti.
28/9/96	100 0 0	"	"	" ..	Triple Alliance ..	William Dunn.
28/9/96	100 0 0	"	"	" ..	Imperial ..	Hubert Bounstridge.
28/9/96	98 2 36	"	X.	" ..	Premier ..	James Marshall.
28/9/96	98 2 32	"	"	" ..	Golden Crown ..	John Caples.
26/10/96	98 2 0	"	XIV.	" ..	Victoria ..	James Armstrong.
26/10/96	100 0 0	"	"	" ..	Corrie's Reward ..	James McMeekin and three others.
26/10/96	97 1 24	"	"	" ..	Napoleon ..	William Fraser.
19/11/96	100 0 0	"	"	" ..	Sunlight ..	Henry Dearing.
7/12/96	97 0 0	"	IX.	" ..	Trilby ..	Joseph Billingham.
25/1/97	100 0 0	"	"	" ..	Alpha ..	John T. Tidd.
7/12/96	100 0 0	"	X.	" ..	Comstock ..	Henry Watterson and Edward Carton.
25/1/97	98 1 4	"	"	" ..	Sunbeam ..	Donald MacGregor.
7/12/96	37 1 26	"	"	" ..	Paparoa ..	Joseph Mandel.
25/1/97	97 3 18	"	"	" ..	Tawhau ..	William Williams.
25/1/97	100 0 0	"	XIV.	" ..	Taffy ..	James Hargreaves.
25/1/97	99 1 10	"	"	" ..	South Pole ..	Thomas Jolliffe.
25/1/97	99 0 0	"	"	" ..	Nil Desperandum ..	John Leitch.
25/1/97	100 0 0	"	II.	Mawheranui	Mount Sewell ..	Frederick Henry Kells.
22/2/97	100 0 0	"	IX.	Waiwhero ..	Golden Lead ..	Thomas George Davies.
22/2/97	95 0 13	"	X.	" ..	Golden Gully ..	Gerald Perotti.
22/2/97	100 0 0	"	IX.	" ..	Midland Consolidated	James Brimble.
22/2/97	98 1 32	"	"	" ..	Red Lion ..	George Brown.
26/4/97	100 0 0	"	"	" ..	Utunui ..	Joseph McLean.
26/4/97	96 2 7	"	X.	" ..	Princess ..	George Brown.
26/4/97	100 0 0	"	XI.	Mawheranui	Orleans ..	Joseph Scott.
26/4/97	99 2 16	"	X.	Waiwhero ..	Prophet ..	Gardiner Wilson.
21/3/98	99 2 38	"	XIV.	" ..	Lord Harris ..	Thomas H. Garth.
21/3/98	100 0 0	"	IX.	" ..	Mawhera ..	Thomas Watson Wilson.
21/3/98	99 3 26	"	X.	" ..	Mount Cashel ..	Patrick O'Boyle.
21/3/98	100 0 0	"	XIV.	" ..	Klondyke ..	Edward Carton.
21/3/98	100 0 0	"	X.	" ..	Kumara ..	Gardiner Wilson.
21/3/98	99 3 7	"	XIII.	" ..	El Dorado ..	Thomas Jolliffe.
22/6/96	30 0 0	"	XIV.	" ..	Roaring Meg ..	Gerald Perotti and five others.
24/8/96	20 0 17	"	"	" ..	Aurora Gold-mining Co.	Gerald Perotti.
28/9/96	29 1 7	"	IV.	" ..	Lady Wylde Gold-mining Co.	John O'Brien and four others.
<i>Greymouth.</i>						
22/11/94	16 2 1	"	V.	Mawheranui	" ..	Walter E. Church.
22/11/94	30 0 0	"	"	" ..	" ..	John McGain and others.
24/1/95	15 0 28	"	"	" ..	" ..	Charles Curtis.
24/1/95	15 0 28	"	"	" ..	" ..	Harry Feary.
24/1/95	16 0 3	"	"	" ..	" ..	Henry Dearing.
24/1/95	16 0 1	"	"	" ..	" ..	Richard Green.
24/10/95	8 3 24	"	"	" ..	" ..	Thomas Jones.
9/1/96	16 2 33	"	"	" ..	" ..	Thomas Bland.
22/10/96	16 0 36	"	"	" ..	" ..	John McGain.

**ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices—continued.**

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Greymouth—continued.</i>						
1/9/94	A. B. P. 32 0 0	..	V.	Mawheranui	Julian Gold-mining Co. (Ltd.)	Walter E. Church.
9/9/96	88 2 27	..	"	"	Paparoa Gold-mining Co. (Ltd.)	The Paparoa Gold-mining Co. (Ltd.).
21/12/96	99 0 0	..	"	"	Ditto ..	James Creagh.
21/12/96	99 0 0	..	"	"	..	T. W. Tymons.
1/3/97	100 0 0	..	"	"	..	Jeremiah O'Donnell, jun.
1/3/97	99 0 0	..	"	"	..	W. H. Kells.
1/3/97	100 0 0	..	"	"	..	James L. Doogan.
<i>Ross.</i>						
21/10/95	40 0 0	Bald Hill ..	VII.	Totara ..	United Helvetia ..	Antonio Zala.
25/4/96	100 0 0	Farmer's Creek ..	"	" ..	Helvetia ..	"
25/4/96	100 0 0	Cedar Creek ..	"	" ..	Alpha ..	William D. Verschoyle.
23/12/96	50 0 0	Donnelly's Creek ..	II.	" ..	Captain Russell ..	Antonio Zala.
23/12/96	100 0 0	Cedar Creek ..	VI.	" ..	Cedar Creek ..	W. D. Verschoyle and party.
2/10/89	10 0 0	Between German and Sailor's Gullies ..	II.	Totara ..	Mount Greenland ..	Mont D'Or Gold-mining Co.
2/10/89	21 1 32	Ditto ..	"	" ..	Mont D'Or Extd. ..	"
14/2/91	7 0 0	Mt. Greenland ..	"	" ..	Mont D'Or ..	"
7/10/93	10 0 0	Lake Ianthe ..	XV.	Waitahu ..	Benford and Co. ..	Ernest Denis and party.
3/12/94	6 0 0	Redman's Creek ..	I.	Totara ..	Chamberlain's ..	Robert G. Chamberlain.
1/3/83	60 0 0	Donoghue's ..	"	" ..	..	Ross United Gold-mining Co.
1/3/84	25 0 0	Head of Sailor's and Blockade Gullies ..	II.	" ..	..	Mont D'Or Gold-mining Co.
1/5/84	43 0 3	Jones's Flat ..	"	" ..	..	Ross United Gold-mining Co.
23/12/96	100 0 0	..	"	" ..	Mont D'Or No. 2 ..	Mont D'Or Gold-mining Co.
23/12/96	50 0 0	Redman's ..	I.	" ..	Star of the South ..	E. Harris.
2/3/97	60 0 0	Mikonui River ..	"	" ..	Kohinoor ..	Charles Holley and W. Thomson.

**MARLBOROUGH.**

Mining in the Marlborough District, so far as quartz is concerned, is practically at a standstill. The Ravenscliff Company at Waikakaho, and the Golden Bar Mine, at Wakamarina, not having been worked for some considerable time.

**COLLINGWOOD DISTRICT.**

*West Wanganui.*

*Golden Ridge Mine* (Owners, Taitapu Gold Estates, Limited).—Mining operations were vigorously carried on. The battery of one Blake stone-breaker, twenty stamps, four berdans, and one pan was erected. The machinery is driven by a 6 ft. Pelton wheel, with a head of 450 ft. pressure, the water-race being one mile in length, including a tunnel of 1,000 ft. The amount of capital expended on mill and machinery was £10,000, and on the water-race £4,000. A parcel of quartz crushed yielded 49 oz. of gold; value, £160; but, as a considerable tonnage was treated, the result was not profitable, consequently no great amount of work is now being carried on, and no other return has been made. Sixty men were employed.

*Red Hill* (Area, 100 acres, situated about six miles from Collingwood; owned by a syndicate).—A tunnel about 680 ft. in length had been driven some time ago, but no work has been done during the year.

Messrs. Washbourne have hematite-works on the Parapara Stream; there is a crushing-mill of six stamps and four berdans used in reducing the ore. The yield is 80 tons a year. It is put up in canvas bags containing 28 lb. or 56 lb., and is worth £12 per ton in Nelson, where it finds a ready sale. Preparations are being made to produce a knife-polishing powder.

*Taitapu.*

The Australasian Gold Trust Company and the New Zealand Pioneers Company, both of London, hold prospecting rights from the Taitapu Gold Estates (Limited), which enable them to prospect for gold and other metals and peg off and lease certain-sized areas of lands within that company's freehold of 88,350 acres. These companies commenced operations in May, 1896, and have continuously since then been engaged in prospecting and proving reefs. Two areas of ground, each of 50 acres, were pegged off immediately south of the Golden Ridge (the proprietary claim), in each of which the reef was found to outcrop. On the area next to the Golden Ridge, named Block II., a shaft was put down on the reef for a distance of 150 ft.; then a drive was put in 200 ft. south to cut the lode on level of bottom of winze. This drive cut the reef at 180 ft., and was then connected with the shaft by driving along the reef. The reef was also followed 200 ft. south of drive, making, in all, 400 ft. driven along the reef. Operations then ceased for a time, and work was concentrated on the next area, Block III. The country here is precipitous, varying from 45° to 60° in an easterly direction. A drive was put in at 70 ft. below outcrop, cutting the reef at 115 ft., the underlie being west, at an angle of 49°. Drives were then put in north 130 ft. and south 200 ft., disclosing a large quantity of quartz, a parcel of which of

20 tons was recently packed over to the Taitapu Company's battery and crushed, with a result of 65 oz. smelted gold, or an average of  $3\frac{1}{2}$  oz. per ton of 2,240 lb. A winze was then started on the reef, but water soon stopped operations there. Another level to drain the reef was put in 102 ft. lower than No. 1, which cut the reef at 300 ft. Drives on the reef are now being carried on from this level. North 130 ft. has been driven, and south 50 ft. A rise has also been put up and connected with No. 1 level, carrying the reef the whole way. The reef varies in No. 1 level from 1 ft. to 6 ft. in width, and is about the same size in No. 2 level. Blocks II. and III. each comprise 50 acres, and it is the intention of the owners to fully prospect them before erecting machinery or connecting the mine with machinery already erected. During the year from twelve to sixteen men have been constantly employed, and, in addition to the work here described, a large amount of trenching and other surface workings has been done.

The Golden Gully property belongs to the Collingwood Goldfields Company, but they are developing their Quartz Ranges property.

Work has also been carried on in the Louisa and Southern Waihi properties.

*Science Defeated Claim, Waitapu.*—(I. S. M. Jacobsen, owner; area, 16 acres.)—This claim has been prospected during the year by the owner, who has erected a small plant for the treatment of the ore, which is considered by him to be refractory. A battery of four stamps and a furnace has been used in the treatment of the stone, but the results have not come up to the expectations of those interested. During the year reports were in circulation that a large deposit of platinum had been discovered on this ground, and that the results of an assay made in Australia for a syndicate who were interested showed the deposit to be phenomenally rich. Assays made at the Colonial Laboratory, however, did not disclose any trace of platina, and declared the stone to be a hematite of small commercial value. The owner has devoted much time and a considerable amount of money in endeavouring to demonstrate the value of his property, but so far without result.

#### Motueka.

Steps are being taken to mine the asbestos which was found on the land taken up under mineral licenses. A party of men were employed in opening up a pack-track from the ground to the Mount Arthur Track, in order to admit of a parcel of 20 tons being conveyed to a seaport.

Prospecting for copper has been carried on in the Wangamoa district, about four miles from the accommodation-house on the Havelock-Nelson Road, and also in other parts of the Nelson District.

#### WESTPORT.

##### Mokihinui.

Fairly good patches, or small chutes, of auriferous quartz have been found from time to time in the Mokihinui district, at what was known as the "Mokihinui Reefs," which is on the north side of the river, and in the Red Queen Claim, on the south side of river. All mining operations are suspended at this place now; but at the commencement of the late mining boom a new reef was discovered about a mile lower down the river than the Red Queen and Mokihinui reefs. Gold was seen visibly in the outcrops, and two special claims were taken up, termed the Lady Agnes and Carson's Reward. An option of this property was taken up by the Anglo-Continental Syndicate, who constructed an adit level on the line of reef from the side of the range facing the Mokihinui. This adit was constructed so as to be about 80 ft. below the place where gold was seen on the surface. The lode in the adit level is from 4 ft. to 6 ft. in width, having well-defined walls, and carrying a little gold, but not nearly sufficient to pay for the expense of working. After the adit was constructed for about 250 ft., and a good way past the place where there was apparently a chute of payable ore on the surface, without any auriferous quartz of a payable character being found, the option was abandoned.

*Waimangaroa.*—The property known as the Beaconsfield has been recently taken up by an English company or syndicate, and operations have been commenced to bail out the water from the shaft, and also to trace the reef into the range on the south side of the river. Several years ago some good stone was found here, but nothing has been done for some time to prove whether it is a payable property or not. Now that the English capital is forthcoming it is likely to be well prospected and proved.

*Republic and Britannia.*—These are separate claims, about a mile and a half further north than the Beaconsfield, and apparently on a belt of country further to the eastward. Very rich auriferous quartz has been found in both these claims from time to time, but the reef has never been found in a well-defined and solid state. Gold to the value of about £12,000 has been obtained from the Republic Claim, which is at an elevation of 1,700 ft. above sea-level. A crushing battery of ten heads of stamps, driven by a Pelton water-wheel, and also an aerial tramway a mile and a half in length, have been erected by the Republic Company. About two years ago the Republic property was taken over by Mr. Jesse King, of Auckland, on behalf of an Auckland syndicate, who has expended a good deal of money on the property without meeting with success. The character of the reefs met with here is merely lenticular veins and leaders, lying at a very low angle from the horizon. These lenticular bodies of quartz occur in bunches all the way down the side of the range. In some of these bunches the lenticles of quartz will be 3 ft. in width, and taper out to a mere thread, which can be seen in some of the workings in the Britannia Claim, going up vertically for a certain height at the end of a bunch, and will form another lenticular body at a higher level.

In driving levels in these lenticular veins they go into the hill for a certain distance as flat as a coal-seam, and then take a jump, almost vertically, either up or down as the case may be, according to the height the adit levels are constructed, into the range. The quartz in these lenticular masses is broken up like so much road-metal. The only quartz that is yet found in this locality occurs in a succession of ledges from the top of the range downwards. Highly auriferous quartz is found in places, but there is not a sufficient quantity available to pay a company to work it.

*Lady Agnes Claim.*—Prospecting work was being done on the surface, and a tunnel driven 250 ft. on the line of reef.

*Red Queen and Swanson Claims.*—Very little work has been done.

#### *Lyell District.*

*United Italy Mine.*—Operations to a limited extent were carried on, but there is no record of any gold returns from this mine, although gold to the value of £11,018 was obtained from the ground since it was first occupied by the present owners in 1882 up to the 31st March, 1897.

*Tyrconnel Mine.*—This ground has been worked on tribute. Rodgers and party had a return of 34 oz. 14 dwt. of gold from 24 tons of quartz, and Smith and party 63 oz. from 37 tons.

*Cræsus Mine* (Area, 16 acres 2 roods).—This mine is owned by a party of three—Kelly, Edge, and Smith. The tunnel where the work is carried on is 800 ft. in length. A small reef from 1 ft. to 2 ft. in width had been worked from this level to the surface some years ago. The present party have only started to prospect this mine since January last, and there are four men now at work driving this tunnel to the northward on a well-defined track of reef with occasional boulders of quartz carrying gold. In connection with the mine there is a ten-head battery (wet process) and two berdans, driven by a turbine wheel which cost about £1,000. The length of water-race is 13 chains, it carries ten heads of water, and cost £300. There have been no returns from this mine for the last twelve months. The battery crushed 37 tons of quartz for the Tyrconnel party, which yielded 63 oz. of retorted gold, and that was the only parcel crushed during the year.

*Alpine Extended Mine* (Area, 154 acres 3 roods 26 perches; owners, the Alpine Extended Gold-mining Company, Limited).—This company was formed by the amalgamation of the United Alpine Quartz-mining Company (Limited) with the Lyell Creek Extended Quartz-mining Company (Limited), which companies had for a number of years been working the same reef on adjoining claims. Immediately prior to the amalgamation neither of the companies were prosecuting with any degree of vigour the works in connection with their mine. Since the amalgamation was agreed upon, in the early part of August, a considerable amount of work has been undertaken by the new company. The Lyell Creek Company's main level, now known as No. 10, became the principal seat of operations. This level took fourteen years to drive, and required to be put in a distance of over 3,500 ft. before the lode or reef was struck. The first work undertaken was to connect this level by a tramway with the United Alpine Company's battery. The No. 10 level was then driven south on the reef, and stone has been carried along for a distance of 366 ft., while only two small breaks have been met with. The reef has varied from 3 ft. to 23 ft. in width, and the quality all through has been payable. Stopping has been carried on above this level, and the weekly output is about 220 tons. A prospecting drive has also been put in to the north on No. 10 level for a distance of 189 ft. Several small bodies of gold-bearing quartz were met, but no solid reef was struck. The prospects in this portion of the mine are encouraging, and the company intend to resume the extension of the prospecting drive as soon as circumstances will permit. Below No. 10 level the main shaft, 10 ft. by 4 ft. 6 in., is sunk for a depth of 100 ft., and the company have an apparently payable block of stone proved for a distance of 112 ft. by an average width of 6 ft. In the upper levels a small amount of prospecting has been carried on, and the No. 4 has been driven north for a distance of 100 ft. without striking any stone of importance. Since the amalgamation in August the company have crushed 3,382 tons of stone, for a return of 1,521 oz. 4 dwt. of retorted gold. Of this, 186 tons, yielding 148 oz. and 12 gr., was crushed for tributers. The total depth from No. 1 to adit is 1,168 ft., and from adit to No. 11 level in the shaft 100 ft. The mine machinery consists of one air-winch, two 10-horse-power air-compressors, one Tangye pump, and the mill machinery (twenty stamps, 8 cwt. each, and four berdans). Two Pelton wheels drive the whole. These are driven by water derived from Lyell Creek, the race being 35 chains in length, carrying fifteen sluice-heads of water; from Irishman's Creek, 15 chains, five-eighths of a head; from Brown's Creek, 27 chains, one head—the whole giving 60-horse power. The total value of gold won since August last was—for owners, £5,379 1s. 2d.; for tributers, £592 19s. 1d.; value per ounce, £3 18s. Total number of men employed, fifty.

Prospecting operations were carried on in the Golden Crown Claim and other claims in the district, but so far without success.

#### REEFTON DISTRICT.

##### *Crushington.*

*Keep-it-Dark Mine* (Area, 56 acres 1 rood 13 perches; owners, Keep-it-Dark Gold-mining Company).—This mine still continues to yield profitable returns, and the exploration work carried on during the year has resulted in the discovery of a fresh block of quartz at No. 1 level, which promises to be remunerative, as a crushing of 100 tons yielded 1,340 oz. of amalgam. Development in the lower workings at No. 7 level has not been so successful. The reef was driven on for 100 ft., and, although of large width, it only yields 4 dwt. of gold per ton. The continuation of stopping on the blocks of reef over No. 5 level produced the bulk of the quartz crushed during the year. The total output from this mine since the first discovery of gold is 125,512 tons of quartz, which yielded 66,719 oz. of gold, valued at £259,793 5s. 8d., out of which dividends to the amount of £113,416 13s. 4d. have been paid. The returns for the past year were 3,281 tons crushed, which yielded 1,024 oz. 2 dwt. 16 gr.; value, £4,096 4s. 3d. Thirty-three men were employed.

*Hercules Mine.*—Work was carried on in a cross-cut at the 470 ft. level, and in extending the north level on the track of the reef. Four men were employed.

*Keep-it-Dark No. 2 Mine.*—The cross-cut at No. 3 level was extended 290 ft. Four men employed.

*Progress Mines of New Zealand (Limited).*—The work of opening up the different sections of the ground, the construction of water-race, and the erection of the new battery has been energeti-

cally carried on during the year, and the treatment of quartz will shortly be commenced. The equipment of the mine is practically complete, and comprises the following works:—

**Hoisting-works:** Hoisting-engine, with two cylinders, 48 in. by 16 in., Corliss valves, two reels each, carrying 1,700 ft. of  $3\frac{1}{2}$  in. by  $\frac{1}{2}$  in. flat steel rope, post brakes and foot brakes; the engine is set on a concrete foundation 10 ft. deep; two horizontal tubular boilers, 16 ft. by 66 in., arranged to run together or separately; common stack, 90 ft. high by 3 ft. diameter; Rand air-compressor, class B type, of a six  $3\frac{1}{2}$  drill capacity. The poppet-heads are 50 ft. high, and sheave-wheels 7 ft. in diameter. The entire plant is housed under two buildings, 90 ft. by 28 ft. by 63 ft. high, and boiler-house 56 ft. by 34 ft. by 32 ft. high. Ore-bin, 45 ft. by 15 ft. by 16 ft., distant 250 ft. from shaft B. The ore passes from this bin into the aerial tramway buckets. Blacksmith's shop and change room are now under construction. Total cost of improvements to date, £7,432. The aerial tramway connecting the mine ore-bin with mill is of the Otto type, the fixed bearing-ropes being 30 mm. on the loaded and 24 mm. diameter on the light side. The buckets, sixty-six in number, each hold 550 lb. of ore. Total length between terminals, 6,796 ft. The capacity has been tested up to 30 tons per hour. The two longest spans are 1,900 ft. and 1,243 ft., and the highest standard, 100 ft. There is a tension station midway on the line, and nineteen intermediate supports in all. The tramway runs by gravity. There is a fall from the loading to the unloading station of 883 ft., and the line passes over a summit 200 ft. higher than the loading terminal.

The mill has forty stamps, with sixteen Frue vanners, two 9 in. by 15 in. Blake rock-crushers, and eight suspended ore-feeders of the Challenge type. The plates are 10 ft. in length. Power is furnished by Pelton water-wheels. The battery is driven by a 6 ft. diameter wheel, water being delivered under an effective head of 168 ft. The vanners are driven by a 3 ft. wheel, with a 166 ft. effective head; and the crushers by a 3 ft. wheel, under 140 ft. pressure. Nine Government heads of water supply the power and feed for the plant. The mill building is 80 ft. by 115 ft., and 83 ft. high. The chlorination plant is in course of construction. The building is 142 ft. in length and 43 ft. wide. The reverberatory furnace is 80 ft. by 14 ft. Three chlorinating-tanks, 9 ft. diameter and 3 ft. deep, and eight precipitating-tanks, 6 ft. diameter and 3 ft. deep.

**Work in the mine:** No. 4 level—Driving, 556 ft.; cross-cutting, 89 ft.; rise to battery level, 35 ft. In the east ground a large block of low-grade ore is being opened, which appears to be part of the old Union ore-chute. No. 5 level—Driving, 623 ft.; cross-cutting, 87 ft.; rise to No. 4 level, 177 ft. Both east and west large bodies of ore have been developed. Intermediate level—Driving, 110 ft.; cross-cutting, 47 ft.; rise to No. 5 level, 183 ft. No. 6 level—Driving, 258 ft.; cross-cutting, 560 ft.; rise to intermediate, 106 ft.; rise to No. 5, 244 ft.; south-east winze, 21 ft.; winze to No. 7, 119 ft. No. 7 level—Driving, 738 ft.; cross-cutting, 582 ft.; rise to bottom level of old Progress workings, 17 ft. Nearly the entire distance driven on this level has been in ore, the cross-cutting being from shaft B to the ore-chutes of the old Globe and Progress Mines. Totals—Driving, 2,285 ft.; cross-cutting, 1,365 ft.; rises, 762 ft.; winzes, 140 ft. Shaft B has been sunk an additional 320 ft., making the total depth 945 ft. This is a three-compartment shaft, and the actual time occupied in sinking was nine months. Total cost, including half the mine-manager's salary, £4,848 6s. 2d., or £5 2s. 7d. per foot. Two stations, 25 ft. by 12 ft. by 10 ft., have been cut at the No. 6 and No. 7 levels. The water-race furnishes power and feed-water to the forty-stamp mill. The length of the race is 10 miles 34 chains. Iron pipes are used—2,850·5 ft. of 20 in., 2,844 ft. of 18 in., 350 ft. of 12 in., and 60 ft. of 6 in., and has a working-capacity of fifteen heads; cost, £15,285.

**Wealth of Nations Mine.**—The works done in the mine during the last year are as follows: The incline-shaft has been sunk 280 ft., making a total of 624 ft. It has been furnished throughout with ladders, stages, rails, guides, and a skip with safety gear made ready for work. A large chamber has been cut out of the rock, and timbered up for winding machinery and chamber at brace of shaft; also, two uprisers for rope-pulleys. In connection with the latter, ore- and waste-bins have been cut in the rock and secured with timber. New rails have been laid in the level for a distance of 1,100 ft. Considerable repairs have also been done in renewing the level timber. On the 200 ft. level a distance of 150 ft. has been retimbered. On the 350 ft. level 320 ft. has been driven north on the track of the lode. The drive is well timbered, and air-pipes fixed for ventilation. On the 500 ft. level 64 ft. of driving has been done northwards on the track of the lode, a chamber formed and timbered at incline shaft, and 40 ft. of the drive timbered up. The leading stope on the east lode has been timbered, and passes formed ready for work. On the south block, on the same level, an uprise of 30 ft. has been made on the lode to form a connection with the old stope, and leave it open to commencement work. In the old stopes, between the 350 ft. and 500 ft. levels, considerable work had to be done to secure the lode and leave it in working-order. 930 tons of ore had to be taken out and the space timbered afresh. On the Energetic side of the hill, the old level, having collapsed, had to be redriven and timbered a distance of 300 ft., and in the 200 ft. level a drain had to be cut and formed under the timber to take the main-shaft water away. About 20 chains of the water-race had to be enlarged, partly rock-cutting, timbering, and fluming. Wages, £180; timber, £10; caretaker's wages, one year, £124: total, approximate, £314.

**Golden Fleece Group.**—This group includes the Low-level Tunnel and adjoining leases. The tunnel has been driven 1,485 ft., cross-cut 610 ft., and a rise of 88 ft. to connect with winze from Golden Fleece. This winze has been sunk a distance of 380 ft. for the year, and is now connected with the tunnel workings. The work for the last twelve months has been confined to making this connection.

**Boatman's Group.**—The cross-cut from the Eureka level was driven a distance of 312 ft., but, having failed to develop anything of value, has been discontinued. No. 5 level in the Welcome has been driven north a distance of 453 ft. There is about 220 ft. of stone, small and broken. A rise was put up 167 ft. on the southern end of the block and cross-cut 21 ft. A cross-cut was put in about 50 ft. down the main rise, 13 ft. to the west, and a track driven on 38 ft.

**Caledonian Group, Larry's Creek.**—Work has been confined to opening up the old workings.

*Merrijigs District.*

*Inkerman Combined Mine* (Area, 456 acres; owners, Inkerman Combined Gold-mines, Limited).—The amount of development work carried on during the year has been very extensive, and suitable mine equipment is provided. A 10-horse-power engine is used for winding, a 30-horse-power engine to work the air-compressor, and a Tangye pump. A No. 2B Little Giant rock-drill is also used. The mill machinery consists of a 40-horse-power steam-engine for driving the 30-stamp mill, but this has not been used, as no quartz was crushed during the year. The development work carried out for the year ending 31st March, 1898, was as follows: At the New Inkerman workings, on the western slope of the main ridge between Rainy Creek and Devil's Creek, sinking the main shaft was proceeded with in February, 1897, and 87 ft. sunk by the 16th April, making the total depth of the shaft at that date 423 ft. At this depth a chamber, measuring 16 ft. by 11 ft. by 8 ft. was constructed, and No. 4 level driven eastward a distance of 605 ft. From this No. 4 level a drive north on a reef track was produced for 126 ft., with a cross-cut to west of 87 ft. To facilitate driving in the No. 4 level (which level will ultimately connect with the low-level tunnel coming in from the other side of the range) a dam was constructed in the No. 3 level, and all water accumulating from the old stopes and from surface percolation was stored behind this dam, a Tangye's pump being employed to lift the dammed water some 319 ft. to the surface. In the surface tunnel north and works (to the eastward of the main shaft), for the year ending the 31st March, 1898, 504½ ft. of new country has been opened up, represented by 383½ ft. driving, 104 ft. sinking, and 17 ft. uprising. Of the above-named distances a winze 104 ft., stopes 53½ ft., and a cross-cut 34 ft. have been opening on ore. At the surface winze (north of Revival Gully) 46½ ft. has been sunk, 23 ft. driven, and 16½ ft. stoped. Of the distance opened, 63 ft. has been on ore. The work carried out at the old Inkerman Mine for the year ending the 31st March, 1898, consists of driving in new country for 818½ ft., and sinking and uprising 212½ ft. Of the above distances, 314 ft. has been opening on ore. To ventilate this portion of the mine it was found necessary to sink an air-shaft 102 ft., and connect this with an old uprise. This air-shaft will be serviceable as a filling-in shaft when the connection between the No. 3 Inkerman ore-bodies and the Low-level Tunnel is completed. The No. 2 Inkerman Block has been driven on for 75 ft., and a winze sunk 6 ft., the whole 81 ft. being on ore. At the Supreme Mine the work carried out for the year ending the 31st March, 1898, has been the opening of 970 ft. of new country, representing 147½ ft. sinking and 822 ft. driving. Of this distance, 514½ ft. has been opening up on ore. The low-level tunnel from Rainy Creek was commenced in February, 1897, and on the 25th March, 1898, had been driven a distance of 2,089 ft. The tunnel was commenced with hand-drills, which were superseded on the 1st May by rock-drills, driven with compressed air. By the first method 221 ft. was driven, representing twelve weeks' work; and by the latter method 1,868 ft., representing forty-six weeks' work; the respective weekly averages being 18.41 ft. and 40.6 ft. The greatest distance driven in the tunnel for any one week has been 64 ft., and the greatest distance driven in any four consecutive weeks has been 199½ ft. Air-boxes (for ventilating purposes) have been laid throughout the tunnel, and are worked by an exhaust, with compressed air obtained from the receiver at the mouth of the tunnel. The power is obtained from a Cornish boiler situated at the battery, which drives a Class C Rand air-compressor, from which the air is conveyed by 1,000 ft. of 3 in. pipes to the receiver at the mouth of the tunnel, and from there to the face. In the construction of the tunnel the principal material used has been: Mining timber—sawn timber, 12,000 ft., 792 props, 412 sills, 1,692 sleepers, 396 caps, 2,342 laths, 822 stays, 5,200 ft. of rails, also 3,100 ft. of 3 in. air-pipes; explosives, &c.—6,050 lb. of gelignite, 6,100 detonators, 26,100 ft. fuse; also 9,960 candles. The work carried out at the Rainy Creek coal-pit has exposed two years' supply of coal, which will be won as required. The seam is from 4 ft. to 4½ ft. in thickness, and is of excellent quality. Since the opening of this working, in May, 1897, the tonnage of coal won and used at the boiler driving the air-compressor has been 365 tons. For the year ending the 25th March, 1898, the country opened up represents 6,157 ft., and the average number of men employed over the same period was sixty-five. The amount of wages paid to the workmen on the mines for the fifteen months ending the 25th March, 1898, was £11,324. (This is exclusive of amounts paid to a number of men employed getting timber by contract, and for driving by contract, and does not include official salaries.)

*Sir Francis Drake Mine.*—The reef in the surface block has been exhausted, and the owners are again making a commencement to further sink the main shaft.

*Golden Lead.*—The owners of this claim continue to carry on work to a limited extent. The battery was used to crush 480 tons of quartz, which yielded 196 oz. 7 dwt. of gold.

*Revival Mine, Devil's Creek* (Area, 86 acres).—This property was bought by Mr. G. Perotti in June, 1897, and since that time four men have been at work prospecting it. Seven months ago a leader 1 ft. in width, giving fair prospects, was discovered, and followed 30 ft. at surface. The men are now driving a tunnel in order to get the stone to the battery. There is a battery of ten heads, driven by water-power, which is now ready to start crushing. Mr. Perotti says, "This mine was formerly known as the Golden Point. A company before me spent £10,000 developing it between 1879 and 1885." In 1885 the whole property was bought by Mr. G. Perotti, who worked it until 1894, at a cost of £9,000, and met with no success. Some very rich stone was found in this claim, and it is possible that the property may yet prove good.

*Painkiller District.*

*Dillon Extended Mine* (Area, 60 acres).—Work in this mine consisted chiefly in driving and stoping on the reef, which is from 1 ft. 6 in. to 5 ft. in width. The aerial tramway was also put in working-order, and a parcel of 60 tons of quartz sent to the mill. Five men were employed.

*Big River Mine* (Area, 38 acres; owners, Big River Gold-mining Company, Limited).—The development work commenced last year in driving at the low level was continued to intersect the line of reef at a distance of 270 ft. from the shaft, which at this level reaches a depth of 930 ft. from the surface. A rise was put up from the low level to meet a winze sunk from the level above.



Several hundred feet of driving was done at the low level, without favourable results. Prospecting was also carried on at the higher levels, and occasional blocks of payable stone were obtained. 480 tons of quartz was crushed, for a return of 390 oz. 11 dwt. of gold; value, £1,582 6s. 1d. A large parcel of accumulated tailings treated by the cyanide process yielded 860 oz. 17 dwt.; value, from £2 10s. to £2 15s. per ounce. Twenty-five men were employed.

#### *Victoria Range.*

An important discovery of auriferous quartz was referred to in my last report, but at that time no prospecting of any consequence had been done to prove whether the large deposit of auriferous stone lying on the surface would be found *in situ*. The prospector, Mr. William Kirwan, and those connected with him, had not sufficient means to carry on large development works, and they entered into an arrangement to give the Anglo-Continental Gold Syndicate (Limited), of London, an option of the property, on certain terms, on condition that it would expend a sum up to £200 per month in developing the property, when the range was not covered with snow. This syndicate commenced operations on the property, which consists of one special claim—namely, the Lord Brassey—and three licensed holdings—the Lady Brassey, Earl Brassey, and Kirwan's Reward—in the end of last year, and have already expended a large amount in carrying on development works without meeting with success in locating the lode from which the rich deposit of auriferous stone on the surface came. Several mining men of good repute have visited and inspected this property, amongst whom may be mentioned Mr. A. McKay, Government Geologist; Mr. Park, formerly Assistant Government Geologist, and also late Director of the School of Mines, Thames; and Mr. H. A. Gordon, the late Inspecting Engineer of the Mines Department, and they all agree that the deposit of auriferous stone on the surface could not come from any other place than the Lord Brassey Claim, where the deposit is lying. The configuration of the country, and the line of the different formations bounding the belt of country-rock in the Lord Brassey Claim, shows that it could not have been brought there from any great distance, and there is little doubt but that the lode *in situ* will yet be found. This range, although it goes under the name of Victoria, is not entitled to be designated by that name. It is several miles distant from the Victoria Range proper, and it is now better known as Kirwan's Hill, the highest point of which is on the Lady Brassey Licensed Holding, being 4,200 ft. above sea-level, and the place where the rich auriferous stone is lying on the surface is about 3,770 ft. above sea-level. There are evidences of a slip having taken place at some remote period from the Lady Brassey Licensed Holding in the direction where the stone is lying, and the sinking of shafts near that particular place shows broken ground to a depth of 30 ft. Two adit levels have been driven into the eastern side of the range for a distance of 250 ft., one of which is 205 ft. under the top of the range and the other 130 ft. In constructing the southernmost adit 30 ft. of loose material, mixed with highly auriferous blocks of quartz, was passed through before the country-rock was met with, which was for a further distance found in a loose broken state. Several leaders of quartz were met with in this adit level, one of which has a width of 18 in., but the quartz has a different structure to that found on the surface, and does not contain gold—at least, not in payable quantities for working. No quartz has yet been found in the northernmost adit level, but none of these adits are sufficiently far ahead at present to prove whether the lode the prospectors are in search of exists in the range or not. Recently the construction of these adit levels has been suspended in order that all the workmen may be employed in prospecting on and near the surface before the bad weather sets in. These surface operations have been so far successful in finding a large deposit of the auriferous quartz to the eastward of where the adit levels commenced, which indicates that the lode from which the rich stone came has been running in a northerly and southerly direction, and underlying eastward at a comparatively low angle to the horizon. This is the direction of the whole of the lodes *in situ* on this range, and their underlie is also in the same direction. Prospecting operations are now being energetically carried on near the place where the deposit of stone below the surface was found, and in all likelihood an adit level will shortly be commenced lower down the east side of the range, to prove whether the lode will be found as indicated. The aim at the present time is to get all the information that can be got from surface indications so long as the good weather continues, as adit levels can be constructed during the time the snow is on the ground.

On the Earl Brassey Licensed Holding there are several lodes, one of which can be traced for a long distance, and a considerable amount of prospecting work has been done on the lode, and also on parallel lodes in the Mark Twain Licensed Holding, but so far no quartz of a payable character for working has been found in any of the claims in this locality. A little gold could be seen in the outcrop in a lode in the Earl Brassey Claim, and an adit level is being constructed on the lode from the north side of the range, which is very steep, and this will soon prove whether payable ore exists in this claim or not. It may be mentioned that the present value of the Kirwan's Syndicate Company's property is considerably exaggerated. It may be termed a first-class prospecting venture, and beyond this nothing is known as to whether the lode being searched for *in situ* will be found or not.

The following is the report of Mr. A. McKay, the Government Geologist, on the auriferous rocks of the western slopes of the Victoria Mountains:—

"As directed, I visited and partly explored the western slopes of the Victoria Mountains, and made an examination of the area of loose auriferous quartz on Kirwan's Hill, and of several lodes in the same vicinity, on which I have the honour to report as follows:—

"The discovery on the northern slope of Kirwan's Hill of a considerable area over which are strewed a covering of loose blocks of auriferous quartz has led during the past season to a great amount of prospecting there, in the vicinity and surrounding district. The result has been the discovery of numerous reefs of quartz within the area lying between the upper part of Larry's Creek and the upper part of the Waitahu or north branch of the Inangabua River. Of the reefs found, none of them as yet afford prospects of gold equal to what are to be obtained from the loose quartz on the northern slopes of Kirwan's Hill. This loose quartz occurs in blocks of all



sizes up to masses 2 to 3 tons in weight, and thickly covers the surface over an area of 10 or 12 chains in length, with an average breadth of 4 to 5 chains. The quartz is chiefly, if not wholly, confined to the surface, although masses of the wrecked hill-slope do here and there show portions of reefs held within walls of sandstone and slate rocks identical with the general formation of Kirwan's Hill and the country eastward to Caplestone. Towards the lower end of the quartz-covered area, and where the stone was richest in gold, a tunnel has been driven west into the hill, in the hope that by this means solid ground might be entered, and the lode from which the richer quartz has been derived thus discovered. At a distance of 150 ft. from where started the tunnel driven west into the hill failed to reach solid rock, and no reef was discovered; yet, more remarkable, scarcely a fragment of quartz was found more than 3 ft. below the surface in the tunnel workings. At the present time, at the opposite northern end of the field of quartz, a shaft is being sunk to prove the depth to the solid rock, and this shows the same remarkable absence of quartz from all but the very surface of the *débris*-covered mountain-slope. This shaft, when visited, had reached a depth of 35 ft., and had not passed through the broken angular material met with in the tunnel lower down the spur. On the north-eastern part of Kirwan's Hill, and in the ridge thence going east and north-east to connect with Trig Hill there are numerous reefs that strike south-south-east and dip east-north-east at high angles, and thus should pass but a little to the eastward of the field of loose quartz on the northern slope of Kirwan's Hill. It must, however, be noted that on the north and north-north-west higher part of the hill no notable discovery of quartz has been made (none were reported to me), and westward, along the road leading to the upper part of Boatman's Creek and Caplestone, in the side-cuttings of the road rarely is a piece of quartz to be seen. All the lodes of quartz found are poor in gold compared with the richer of the loose blocks of the quartz-covered surface on Kirwan's Hill, and some would seek to refer the latter to a distant source, and consider that the lodes and the field of loose quartz on the surface are only in accidental juxtaposition. After due consideration of this matter, I have come to the conclusion that the loose quartz is derived from lodes in the immediate vicinity; and the evidence in support of this conclusion fully bears out the decision arrived at. Wherever matrix adheres to the quartz, this, as forming part of the foot- or hanging-wall of the original lode, is of the same character as the foot- and hanging-walls of the lodes that have been discovered. The quartz also closely agrees with that of the lodes found, and the correspondence is complete in all except the amount of gold which is contained in the loose and solid stone.

"All the rocks of Kirwan's Hill and the adjacent ranges to the north and north-east are slates and sandstones belonging to the Maitai series of the New Zealand Geological Survey classification. Outside there are the Victoria Mountains to the east. The rocks are granites and crystalline schists, and, from the absence of a trace of these on Kirwan's Hill, it is not possible that the loose quartz of the northern slope of Kirwan's Hill could have come from these mountains, nor from an eastward direction; nor could the material of the quartz-field have come from the west without at the same time being accompanied by granite from the lower beds of the coal-measures and dark hornblendic diorite from a heavy band of that rock that outcrops on the slope from the higher part of Kirwan's Hill to the source of Boatman's Creek. The rich quartz that is found on the surface of the Lord Brassey Claim has, therefore, in all probability, been derived from a lode not now seen at the surface, and which probably will be found running along the western part of the claim mentioned. More to the westward for a considerable distance there is little indication of the presence of quartz reefs. The whole belongs to the eastern system of quartz lodes found in connection with the Maitai slates that stretch along the east side of the Inangahua and Little Grey Valleys, from the source of the Blackwater in the south to the gorge of Larry's Creek in the north. The slate between the Waitahu and Larry's Creek extends considerably east of the boundary hitherto assigned it, and towards the upper part of Larry's Creek there is a large area over which prospecting might be carried on with a fair show of success."

The following report was made to the Under-Secretary, Mines Department, by the Government Geologist (Mr. A. McKay) on the auriferous character of Boatman's Creek, below Caplestone, Inangahua:—

"In accordance with your instructions, dated the 17th December last, in which I was directed to report on the geological features of the valley of Boatman's Creek, between Cronadon and Caplestone, I have made the examinations required, and have the honour to submit the following report relating to the district above referred to:—

"Boatman's Creek has been worked for gold from Caplestone upwards to the junction of the two main branches of the principal stream, and Little Boatman's Creek has been worked to its source in Specimen Hill. The amount of alluvial gold thus obtained was considerable. The gorge of the creek has been cut many hundred feet into rocks traversed by auriferous quartz lodes, from which much gold has been liberated and carried to various distances down stream. At Caplestone the slates and sandstones carrying quartz lodes are overlain by the coal-bearing series, at the base of which are grit and conglomerate beds that are to some extent gold-bearing. At the lower end of the township the coal series is followed by heavy deposits of conglomerate and coarse gravel, locally known as 'Old-man bottom.' These gravels form hills on both sides of the valley to within a short distance of Cronadon, and over a width of from a quarter to half a mile for a depth of 300 ft. to 400 ft. they have been removed in the formation of the valley of the creek. Gold occurs in the lower beds of the 'Old-man bottom,' and again at a horizon some 60 ft. higher in the formation; and farther down the valley, on Boardman's property, a third horizon of gold-bearing wash is found. The recent alluvial deposits along the valley below Caplestone should therefore contain gold derived—first, from reefs in the slates and sandstones of the Maitai series; second, from the base of the coal-bearing formation; and third, from two or three horizons in the 'Old-man bottom'; and it is only on account of the wet character of the ground that gold workings have not been essayed in that part of the valley west of where the coal-rocks in the low grounds disappear under the gravels of the 'Old-man bottom.' The question of the auriferous character of the gravels constituting the 'Old-man bottom' has been

dealt with in the report containing the description of the blocks reserved for mining purposes (Mines Reports, 1896, C.-9), and Block LIII., within which is situated the part of Boatman's Creek forming the subject of this report, is described at page 4 of the report in question (*q.v.*).

"That portion of the valley of Boatman's Creek which is under consideration has a creek-channel of moderate width, in and along which lies a considerable amount of drift timber. The immediate banks are bare, while the flat ground intervening between the water-course and the hill-slopes are covered by standing timber or tree-stumps, and the presence of these will compel the adoption of special methods of working the auriferous deposits that underlie.

"As bearing on the matter of this report might be raised the question of the auriferous character generally of the 'Old-man bottom.' This has been dealt with sufficiently in the introduction to the description of the blocks reserved for mining purposes above cited, and in the reports for the year 1895, for which see Mines Reports, 1895, C.-13, 'On the Geology of the South-west Part of Nelson and the Northern Part of the Westland District.'"

#### GREY DISTRICT.

##### *Blackball District.*

*Minerva Mine, Blackball, Grey Valley* (Area, 96 acres).—During the past twelve months the owners took out a crushing of 90 tons, for a yield of 14 oz. of gold; value, £48. This not proving payable, the company, disheartened by losses and being £600 in debt, applied for and obtained six months' protection. When this ended, on preparing for a renewal of work, it was found that the water-wheel had collapsed and the pump was damaged. The company is now preparing for the erection of a Pelton wheel and a new pump. Meanwhile one man is prospecting a gold-bearing leader at the surface.

*Garden Gully Mine.*—This mine has been lately disposed of to the Garden Gully Gold-mining Company (No Liability). During the twelve months the company has not succeeded in developing any lode showing payable prospects. In a tunnel driven two years ago a drive was extended 100 ft. along a formation bearing gold, but not payable. Surface prospecting was carried on, disclosing the fact that everywhere, by washing surface, colours of reef gold are obtained. The company has had a winze sunk 50 ft. on a lode about 30 in. in width; the stone yields colours by crushing, but nothing payable. The reef was followed all the way down, and at the bottom of the winze maintains the same width of 30 in. Water is now interfering with the work of sinking at a reasonable cost. As a whole, the claim presents possibilities of fair development, and reef indications everywhere. The tracks of the quartz lodes in this claim are very long, and, although no payable gold exists just now in the tunnel driven on one lode and in the winze sunk on another lode, there is always a fair chance of getting at a chute of payable stone on a gold-bearing reef at any time.

##### *Paparoa Ranges.*

*Cræsus Mine.*—This property is situated at a high elevation on the range, and consequently operations in the mine are much hindered, especially in the winter months. The reef, where it outcrops at the surface, is opened by a winze sunk to a depth of 40 ft., the quartz presenting a compact body of stone 4 ft. in width. Further sinking had to be abandoned on account of water; therefore a cross-cut was driven to further open up the reef and drain off the water. This cross-cut penetrated the reef at a depth of 100 ft. from the surface, where the reef was found to be 2 ft. 6 in. in width, and in driving a level the quartz reef varies from 2 ft. to 5 ft. in width. About 60 tons of quartz from this level are stacked at the entrance to the tunnel, and, as gold is visible throughout the stone, a payable yield may be expected. Another cross-cut, 68 ft. in length, is being continued in order to intersect another reef about 2 ft. in width at a depth of 160 ft. from the outcrop. Favourable prospects are also obtained from the portions of the reef exposed on the surface. Mining timber is a very expensive item, each set costing £1 5s. A battery is now in course of erection at the left-hand branch of Blackball Creek, and the quartz is to be conveyed from the mine by an aerial tramway 120 chains in length. This is nearly completed.

*Poneke Claim.*—A cross-cut has been driven 250 ft., but so far no lode has been cut in the drive. This tunnel will be continued to 500 ft.

*Homeward Bound Claim.*—A small leader carrying gold has been cut in a cross-cut driven 60 ft.

*Red Lion Claim.*—Prospecting on the surface is being carried on in this, and also in the Alpha, Zealandia, Triple Alliance, and Imperial Claims.

*Taffy Claim.*—Several reefs and leaders have been discovered, and in one of these, 3 ft. in width, gold can be seen in the stone.

*Imperial Claim.*—Surface-prospecting only has been done.

##### *Moonlight District.*

Prospecting was carried on in the Paparoa and Prophet Claims. In the former nothing of importance has been found, but in the Prophet a formation of slate and quartz 6 ft. in width shows a little gold at the surface, and a tunnel is being driven to cut this at a lower level.

*Daring's Wonder Claim.*—A reef, 2 ft. in width, was discovered on the surface, and a tunnel will be driven to cut the reef at a lower level. Gold can be seen in the stone on the surface.

##### *Langdon's District.*

The Julian Mine and eight other claims are under option to Mr. E. C. Mills, who is now in London.

The *Victory Mine*, owned by Curtis Brothers, continues to yield payable quartz. 255 tons yielded 240 oz. 7 dwt.

Prospecting was carried on in several of the claims taken up in this district, but the expectations of those interested have not been realised.

## ROSS DISTRICT.

*Zala's Claim.*—The only work carried on has been driving a tunnel to cut the reef at a deeper level. The tunnel is subsidised by Government, and is progressing very slowly, the ground being wet.

Gagliardi and Sons are also driving a tunnel in their claim by the aid of a Government subsidy.

*Cedar Creek.*

*Alpha Claim.*—Very little work was done during the year. The two men employed were lately at work in laying a tramway and repairing the battery in order to test the reefs.

## BATTERY RETURNS.

The following statement, compiled from the monthly returns furnished by owners of quartz-crushing machines under section 308 of "The Mining Act, 1891," shows the quantity of stone crushed and the yield of gold from the various mines for year ending the 31st March, 1898:—

Name of Mine.	Ordinary Quartz crushed.	Gold.	Approximate Value.
	Tons owt. gr.	Oz. dwt. gr.	£ s. d.
Progress Mine ... ..	1,285 0 0	509 19 0	23,505 15 0
Tyrconnel ... ..	61 0 0	97 14 0	
Sir Francis Drake ... ..	1,010 0 0	349 7 5	
Sir Francis Drake, tributers ... ..	107 0 0	49 11 9	
Keep-it-Dark ... ..	3,281 0 0	1,131 7 12	
Wealth of Nations ... ..	932 0 0	189 1 8	
Globe ... ..	2,360 0 0	963 18 0	
United Alpine ... ..	4,093 0 0	1,795 2 5	
Green and party, tributers ... ..	66 0 0	39 3 0	
Rodder and party, tributers ... ..	20 0 0	20 6 0	
Big River ... ..	170 0 0	263 9 0	
Golden Lead ... ..	480 0 0	196 9 22	
A1, tributers ... ..	14 0 0	58 17 0	
A1, tributers ... ..	22 10 0	58 10 0	
A1, tributers ... ..	10 0 0	21 15 0	
Victory ... ..	255 0 0	322 7 12	
	14,166 10 0	6,066 18 1	

*Tailings (Cyanide Treatment).*

	Quantity.	Yield.	Value.
	Tons owt. gr.	Oz. dwt. gr.	£ s. d.
Big River Cyanide-works ... ..	3,975 0 0	860 17 18	3,525 0 0
Cumberland Cyanide-works ... ..	1,600 0 0	483 15 1	

The foregoing returns, showing 7,411 oz. 10 dwt. 20 gr. of gold, made up of 6,066 oz. 18 dwt. 1 gr. from ordinary quartz and 1,344 oz. 12 dwt. 19 gr. by the cyanide process, is short of last year's return by 2,806 oz. This falling-off is chiefly from the mines owned by the Consolidated Goldfields Company, the Big River, Sir Francis Drake, and Keep-it-Dark Mines, whilst the United Alpine and Golden Treasure show an increase. The decrease in the first-named mines is largely due to the nature of the work carried on during the year. Extensive exploration works were in hand, and much of the quartz won from the workings was tested to ascertain the value of the different blocks opened. Next year the tonnage that is to be treated will be very much more, as the new sixty-stamp mill can be kept going. Much cannot be said about increase in other mines, although recent discoveries tend to an increase in the yield from the Keep-it-Dark.

The new battery at the Croesus Mine will also add to the production when a fair start can be made.

A great deal of exploration work must be done to enable other mines to develop the reefs so as to have a reserve of payable stone to work on.

## OTAGO AND SOUTHLAND DISTRICT.

Quartz-workings are carried on in isolated parts of this extensive district from Skipper's and Macetown in the north to Preservation Inlet at the extreme south-western portion of the Middle Island. Attention is again being directed to some of the older mines, and fresh operations in mine development have been commenced.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Arrowtown.</i>						
10/11/91	A. 80 R. 3 P. 35	Macetown ..	XII.	Skipper's Cr'k	Farrell's ..	William John Farrell.
10/11/91	75 2 20	" ..	"	"	" ..	"
12/5/93	52 3 21	" ..	"	"	Glenrock ..	The Glenrock Consolidated (Ltd.).
13/2/94	23 3 26	" ..	XII., XIII.	Shotover ..	Tipperary ..	The Tipperary Gold-mine (Ltd.).
10/4/94	74 1 20	" ..	XII.	Skipper's Cr'k	" ..	"
14/5/95	34 3 26	" ..	XIII.	Shotover ..	" ..	"
12/5/93	29 3 12	" ..	XII.	Skipper's Cr'k	Glenrock ..	The Glenrock Consolidated (Ltd.).
12/5/93	16 0 0	" ..	"	"	" ..	"
12/5/93	10 0 0	" ..	"	"	" ..	"
<i>Queenstown.</i>						
18/6/87	93 3 12	Skipper's Cr'k	II., III.	Skipper's Cr'k	The Phoenix ..	The Achilles Goldfields (Ltd.).
30/8/90	24 0 0	"	II.	"	Achilles ..	"
10/11/91	46 1 4	"	XI.	"	Gallant Tipperary	The Gallant Tipperary Gold-mining Co. (Ltd.).
8/2/96	35 0 26	"	X.	"	Walde's ..	Joseph v. d. Walde.
8/2/96	70 3 38	"	X., XI.	"	Silk's ..	Austias Dottin Silk.
24/9/96	24 1 0	"	"	"	Mackin's ..	R. H. Mackin and party.
24/9/96	25 1 0	"	XI.	"	Cotter's ..	R. J. Cotter and party.
13/8/88	6 0 0	"	III.	"	Achilles ..	The Achilles Goldfields (Ltd.).
1/1/89	2 0 0	"	"	"	" ..	"
19/6/91	2 1 30	"	"	"	" ..	"
12/11/94	30 0 0	"	VI.	"	Cornubia ..	Frederick Evans.
21/1/96	9 1 27	"	X.	"	Crystal ..	The Crystal Mining Co.
31/8/96	20 0 0	"	"	"	" ..	"
2/3/97	20 0 0	"	VI.	"	Dunker ..	Henry Dunker.
2/3/97	20 0 0	"	VI., VII.	"	Stenhouse ..	James Stenhouse.
<i>Cromwell.</i>						
1/12/97	30 3 9	Upper Nevis	III., XIII.	Nevis ..	" ..	Williamson and Lawrence.
1/12/97	54 0 0	" ..	II.	Bannockburn	" ..	Holliday and Butler.
24/12/97	50 0 0	" ..	I.	" ..	" ..	John D. Matthews.
14/2/98	23 1 0	" ..	"	Motatapu ..	" ..	David Weir and party.
<i>Black's.</i>						
21/1/97	30 0 0	Ophir ..	XVIII.	Tiger Hill ..	Green's Reef ..	Robert Sheppard.
21/1/97	25 0 0	" ..	"	" ..	" ..	"
<i>Alexandra.</i>						
1/10/93	10 0 0	Old Man Range	II.	Cairnhill ..	Belle and Beaux	Robert Symes and another.
3/10/93	9 0 0	"	"	" ..	Exhibition ..	Robert Symes.
1/7/92	15 0 0	"	"	" ..	White's Reef ..	"
27/4/97	10 0 0	"	"	" ..	" ..	"
<i>Roxburgh.</i>						
7/6/97	100 0 0	Upper Waikaia	III.	Whitecomb ..	Elliott and Party	D. H. Parker.
18/6/97	28 0 0	"	"	" ..	" ..	James Elliott.
18/9/97	77 0 0	Campbell's Creek	"	" ..	" ..	D. H. Parker and others.
<i>Lawrence.</i>						
13/7/96	58 3 0	" ..	XI.	Tuapeka East	" ..	John Lawson.
28/7/96	28 2 0	" ..	IV.	Waipori ..	" ..	Robert Cotton.
15/2/97	100 0 0	" ..	XIV., XV.	Tuapeka East	Bella ..	Charles Todd.
15/2/97	20 2 30	" ..	XIX.	" ..	Diver ..	D. C. Simpson.
15/2/97	98 1 0	" ..	XI.	Table Hill ..	Quiver ..	William R. Wright and another.
29/3/97	26 1 30	Waitabuna ..	VII.	" ..	Burnt Creek ..	Walter Hislop.
6/5/97	28 0 20	"	VII., V.	" ..	Try Again ..	Alexander Garden.
23/9/97	54 0 11	"	V.	" ..	" ..	John Lawson.
23/9/97	28 3 34	Waipori ..	IV.	Hedgehope ..	Rodgers and Party	Patrick J. Rodgers and party.
12/11/97	76 1 32	" ..	"	" ..	O.P.Q. ..	O.P.Q. Gold-mines (Ltd.).
9/12/87	5 2 28	" ..	"	Waipori ..	" ..	Robert Cotton.
27/10/96	30 0 0	" ..	V.	Table Hill ..	Canada Reef ..	A. Kerridge and party.
<i>Naseby.</i>						
1/1/88	20 0 0	Sutton ..	I.	Nenthorn ..	" ..	John Symes and others.
18/9/96	53 3 10	Nenthorn ..	V.	Budle ..	Blue Slate Junction Gold-mining Co.	James A. Sligo.
16/3/97	82 2 0	Mt. Highlay, Hyde	"	Highlay ..	Mareburn Water-race and Gold-mining Co.	Alexander Bartleman and A. Hogg.
1/9/95	30 0 0	Ditto	"	" ..	Mount Highlay Syndicate	"
27/10/96	30 0 0	"	"	" ..	El Dorado Quartz-mining Co.	John Kinney.
27/10/96	30 0 0	"	"	" ..	El Dorado Co. ..	Michael Prendergast.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Waruen's Offices—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Naseby—continued.</i>						
27/10/96	A. B. P. 80 0 0	Mt. Highlay, Hyde	VIII.	Highlay ..	El Dorado Co. ..	William Guffie.
22/4/97	80 0 0	Nenthorn ..	III.	Hummock ..	Glenken Co. ..	William Ralston Wright.
22/4/97	18 2 9	Dunback ..	V.	Dunback ..	Golden Treasure Quarts - mining Syndicate	Frederick G. Glover and A. Sutherland.
31/8/97	20 0 0	Nenthorn ..	IV.	Budle ..	..	H. N. Mills and others.
30/9/97	80 0 0	"	IX.	Dunback ..	..	Francis Phelan and others.
30/9/97	80 0 0	"	..	..	..	..
2/2/98	80 0 0	Dunback ..	VIII.	" ..	Golden Bar Quarts-mining Co.	Arnold Sturm.
<i>Dunedin.</i>						
20/5/97	98 2 0	Nenthorn ..	XI.	Nenthorn ..	..	Barewood Quarts-mining Co. (Ltd.).
7/6/97	97 1 17	" ..	XII.	" ..	..	Peter Montello.
17/6/97	90 1 8	" ..	VII.	" ..	..	R. Lee.
16/8/97	100 0 0	" ..	VI., VII.	" ..	..	Barewood Quarts-mining Co. (Ltd.).
9/9/97	86 0 14	" ..	XI., VII.	" ..	..	"
9/9/97	57 3 24	" ..	VI., VII.	" ..	..	"
9/9/97	52 0 29	" ..	VII.	" ..	..	"
20/10/98	48 2 0	Mount Hyde	IV.	Mount Hyde	..	Johannesburg and New Zealand Exploration Co. (Ltd.).
10/1/96	80 0 0	Nenthorn ..	XII.	Nenthorn ..	..	Lyders, Lorie, and Isaacs.
10/1/96	80 0 0	" ..	"	" ..	..	Frederick Evans.
10/1/96	80 0 0	" ..	"	" ..	..	Peter Andrew Lyders.
7/2/96	80 0 0	" ..	"	" ..	..	..
6/3/96	80 0 0	" ..	"	" ..	..	Edmund R. Smith.
6/3/96	80 0 0	" ..	"	" ..	..	Ernest Turner.
6/3/96	80 0 0	" ..	"	" ..	..	Duncan McDonald.
7/8/96	80 0 0	" ..	VI.	" ..	..	E. Turner and another.
11/8/96	80 0 0	" ..	VII.	" ..	..	H. Piper.
2/10/96	80 0 0	" ..	XI.	" ..	..	"
2/10/96	80 0 0	" ..	"	" ..	..	"
2/10/96	80 0 0	" ..	"	" ..	..	Caledonian Gold-mining Co.
8/1/97	80 0 0	" ..	"	" ..	..	George Smith.
8/1/97	80 0 0	" ..	"	" ..	..	London and New Zealand Exploration Co. and Anglo-Continental Gold-mining Syndicate.
8/1/97	16 0 2	Mount Hyde	V.	Mount Hyde	..	Montague Craddock.
4/6/97	80 0 0	Nenthorn ..	VI.	Nenthorn ..	..	Lyders and Harrison.
4/6/97	80 0 0	" ..	XII.	" ..	..	"
2/7/97	27 2 6	Mount Hyde	V.	Mount Hyde	..	"
2/7/97	80 0 0	" ..	"	" ..	..	"
6/8/97	26 1 10	Nenthorn ..	XI.	Nenthorn ..	..	D. C. Simpson.
6/8/97	80 0 0	" ..	VII.	" ..	..	Robert Lee.
8/9/97	80 0 0	" ..	XII.	" ..	..	Montague Craddock.
8/9/97	16 0 0	" ..	I.	" ..	..	James Hunter.
1/10/97	80 0 0	" ..	V.	" ..	..	"
4/3/98	29 1 23	Waikouaiti ..	VII.	Waikouaiti ..	..	Smith and others.
<i>Waikaia.</i>						
24/8/96	79 2 12	..	VII.	Nokomai ..	Nokomai Quarts Claim	A. Meder and D. McKinnon.
29/1/98	80 0 0	..	V.	Waikaia ..	Record Reign Q.-crushing Co.	D. Ferguson and Co.
<i>Riverton.</i>						
29/4/97	97 1 24	Preservation	III.	Preservation	Terewai ..	Tarawera Mining Co.
6/5/97	100 0 0	"	I.	" ..	Jessica ..	Jessie M. Ellis.
31/5/97	95 0 25	"	IV.	" ..	Geelong Extended	Radford H. Brodrick.
9/9/97	40 2 0	Waiau ..	..	Waiau ..	Auckland Gold-mining Co.	Francis Hull.
9/9/97	99 3 21	Preservation	II.	Preservation	Coorang ..	Thomas C. Ellis.
9/9/97	99 0 0	"	"	"	Aldinga ..	"
9/9/97	99 0 0	"	"	"	Te Whara ..	Richard Allen.
29/11/97	49 0 0	West Waiau	VII.	Alton ..	Rowallan ..	Philip Payne.
8/1/98	98 0 0	"	..	Takitimo ..	Sunnyside ..	Charles Hawson.
8/1/98	96 2 0	"	..	"	Belmont ..	Caleb Froggatt.
13/4/97	80 0 0	Preservation	I.	Preservation	Alpha ..	Alpha Gold-mining Co.
13/4/97	80 0 0	"	"	"	Dawn ..	"
13/4/97	8 3 31	Waiau ..	IX.	Alton ..	Camp ..	Hugh Erskine and J. H. Tresseder.
13/4/97	80 0 0	Preservation	I.	Preservation	Winnifred ..	Jessie M. Ellis.
4/5/97	24 2 34	"	IV.	"	Last Chance ..	Guy A. Whealber.
4/5/97	80 0 0	"	"	"	Dot ..	Richard Allen.
4/5/97	11 1 6	"	"	"	Little Dot ..	"
7/9/97	80 0 0	"	II.	"	Starlight ..	William Seater.
5/10/97	80 0 0	"	"	"	Easter Gift ..	Thomas D. Suddaby.
25/1/98	28 0 0	"	IV.	"	Comet ..	Caleb Froggatt.
25/1/98	29 3 15	"	..	"	Reward ..	Charles S. Longuet and H. A. Macdonald.

*Macetown District.*

*Premier Mine* (Area, 52 acres 3 roods 21 perches; owners, Glenrock Consolidated, Limited).—This mine is worked from an adit 2,000 ft. in length, from which, at a point 1,600 ft. from the entrance, an incline has been on the strike of the reef, with a grade of 1 in 4, the winding from which is done by an electric motor, the dynamo being driven at the battery, from which cables lead into the adit tunnel. Prospecting work is also being carried on at a level 180 ft. above the main working adit. Mr. W. J. Stanford, general manager and engineer, has given the following account of the works carried out and other matters in connection with the mine:—

“The past year’s operations up to the present date have been most successful—in fact, it is the first year that the mine has been self-supporting. Not only has it been self-supporting, but at the present date has also remitted the sum of £3,150 to London clear of all charges. Since the golden chute was picked up again in October, 1896, it has continued steadily, on an even downwards pitch, up to the present date. The grade of the incline has never been altered from 1 in 4, and it has carried the bottom of the golden stone the whole way. A new and interesting feature in the occurrence of the chute is that, while before the fault was met with in 1895 the chute was in one continuous block of about 40 ft. wide, now below the fault the chute is apparently split in two, and there are, as it were, two separate chutes having exactly the same pitch one above the other, and separated by about 20 ft. to 25 ft. of mullock or barren-lode filling. It is an open question whether the two blocks of golden stone are not on two separate and distinct lines of reef. The foot-wall and hanging-wall in the incline are very well defined, but as we rise in the stopes they separate. The foot-wall, a hard strong wall, leads up to the upper block of “golden stone,” while the lower block of “golden stone” carries the hanging-wall of the incline to form a separate pair of walls of its own. It is just as if there were two lines of reef, each with its own chute of gold, and the two lines converge and meet in the incline. Each block of stone is from 20 ft. to 25 ft. in width, but, while the lower block will only mill about 10 dwt., the upper block is good for from 1 oz. to 1½ oz. to the ton. A crushing taken only from the upper block in May, 1897, yielded 516 oz. 17 dwt. 12 gr. from 400 tons crushed; value, £2,082 4s. 1d., or 1 oz. 5 dwt. 20 gr. to the ton. In October a similar crushing gave 434 oz. 11 dwt. 12 gr., or 1 oz. 3 dwt. 11 gr. per ton. We are now trying to equalise the returns by mixing the blocks as far as possible. The incline measured on the 26th February, two days after your visit, 724 ft., and is now about 150 ft. below (vertically) the adit level. The rate of hauling has been increased to 100 ft. a minute, and we are able to bring three trucks up at a time, each holding 12 cwt. of quartz, and, as the dynamo and motor are not now being driven anything like up to their full capacity, as we get deeper, by increasing the size of the rope, by driving the dynamo from a separate water-supply, we shall be able to haul up six trucks at a time. I think there will be no difficulty in going with the present gear to a depth of 3,000 ft., and, as it will take up fully six years to reach that depth, there is no immediate anxiety about our hauling capabilities. No other work has been done in the Premier Mine during the year outside the operations to keep the mill supplied, except repairs to main levels. There was a length of about 300 ft. close to the hauling machinery where the tunnel was fast closing in, and this has been retimbered throughout with strong timber. Again, the high level, 180 ft. above the low-level adit, having been abandoned for some years, was in a complete state of collapse, and £300 has been spent in four months’ work before driving ahead to prospect the ground could be resumed. The quartz, after being hauled up the incline, is drawn by horse-power through the adit 1,600 ft. to the surface; thence about 100 yards to a quartz paddock, where the trucks are tipped, and return to the mine. A tram-line 200 yards in length connects the paddock with the mill. The trucks are filled by means of a shoot below the paddock, and run by a boy to the grizzly shoot at the mill. The grizzly is 10½ ft. long, and formed of 3 in. by ¾ in. iron, the bars set 2½ in. apart. The whole grizzly is 3 ft. wide. The finer quartz passes through the bars, and is carried by means of side-shoots to the ore-bins behind the mill. The coarser stone goes straight on into the stone-crusher, which is a Blake-Marsden, 15 in. by 10 in. jaws. There are two ore-bins, one behind each ten head of stamps, and holding respectively 24 tons and 40 tons when full. The stone is fed into the mortar-boxes by the vibration of the mill, which works fairly well as long as the stone is quite dry, but directly the stone is sent at all wet the feeding is most irregular. Unfortunately, we are cramped for space and fall, and it is impossible to get in automatic feeders. During the past year the old shanks and tappets have been replaced by new and heavier ones, increasing the weight of each stamp from 600 lb. to 750 lb., and increasing thereby the crushing-capacity of each five head of stamps from 30 tons per week of 144 hours to 50 tons in the same time. The gratings used on the mill are punched Russia iron, 189–200 holes to the square inch, which is equivalent to wire-cloth of 725 holes to the square inch. The pulp passes from the boxes into a trough, and thence over blanket-tables. In front of each box there is first a length of 8 ft. by 6 ft. of table, divided into three strakes, and it is on these that the bulk of the gold is caught. These strakes discharge into a trough, and thence over another set of three 12 ft.-long blankets. The top blankets are washed every hour and a half, and the tail blankets every two hours and a half, and these concentrates are passed through berdans charged with 25 lb. of quicksilver. The concentrates, freed of all their loose gold, pass on in launders to the cyanide-works, where they are treated with satisfactory results. Samples of the mill tailings are taken at the tails of the blankets every hour, and these samples are assayed regularly, showing that the average total loss does not exceed 1 dwt. 7 gr. per ton. The cost of all milling charges, with only fifteen head of stamps running, averages 3s. per ton, one man and one boy being employed on each shift; and this very low cost will be considerably reduced next month when the other five head of stamps which is now being added to the mill is in running-order. The mill is driven by a 6 ft. Pelton wheel, under 560 ft. of pressure, using from 45 to 60 cubic feet a minute. In common with other companies who depend on water for their power, we suffer from the very dry months in summer and from the

frosts in winter. In the winter, however, during the severest frosts, it has been found, during the last two winters, that as long as we can keep the pipes running full there is no difficulty about crushing. We have a big boiler in the mill, and can keep the tables easily thawed with hot water, the only difficulty arises when there is not sufficient water in the creek to keep the pipes full. If the pipes are not full, ice forms during the early hours of the day round the edges of the water running in the pipes, and when the sun gets on the pipes later in the day this ice becomes detached and comes down, blocking the pipes near the mill. Then there is trouble. This has only happened once. Since then we watch the pressure-gauge during the night, and if we see the pressure falling we send up to the dam and turn the water off till 8 a.m., when it is quite safe to turn the water on again for the day. It has been observed that it is only for the few nights about the nights of greatest moonlight, in the months of June, July, and August, that any serious trouble occurs; but these observations are limited to the last two years, and it is possible that other seasons will yet give more trouble. There are at present employed by the company sixty-one men altogether, as follows: Prospecting in Sunrise Mine, 4; prospecting in high-level adit, 4; smithy (2), carpenters (2), 4; foreman (1), trucking, hauling (6), 7; mining stone for the mill, 42: total, 61.

"The cost of mining runs to about 17s. per ton—that is, stoping pure and simple. The incline costs us about £3 10s. a foot to drive and timber—the timber alone costing 10s. a foot, and candles, caps, fuse, and gelignite 5s. a foot. Good accommodation is now provided for the men in the shape of weatherboarded huts lined throughout with lining-boards. A small weekly rent is charged for the use of these.

"The following table shows result of mill crushing for 1897:—

		Tons.	Yield.			Value.			Yield per Ton.	Value per Ounce.			Mill running.		
			Oz.	dwt.	gr.	£	s.	d.	Dwt.	gr.	£	s.	d.	Days	hr.
January	...	248	56	17	0	574	13	7	9	14	4	0	1½	14	19
February	...	180	86	9	6				9	14				13	14
March	...	250	144	10	10				11	11				15	11½
April	...	245	206	14	12	1,414	5	6	16	20	4	0	6	15	4
May	...	400	516	17	12	2,082	4	1	25	20	4	0	6½	22	5
June	...	265	256	7	16	1,025	8	4	19	8	4	0	0	15	17
July	...	...	33	11	3	215	1	8	...	...	4	0	0½	13	21
August	...	500	155	18	18	629	8	3	8	5	4	0	8	21	0½
September	...	450	211	10	0	855	2	10	9	9	4	0	10	27	21
October	..	370	434	11	12	1,749	9	10	23	11	4	0	6	20	19
November	...	460	377	6	12	1,464	8	5	16	10	3	17	6	20	17½
December	...	480	321	6	12	1,298	4	10	13	9	4	0	9	26	10½
Total and averages		3,848	2,802	0	17	11,308	7	4	14 12 (average.)		4	0	1 (average.)	227	16

"Concentrates: 43 tons yielded by the cyanide process 67 oz. 12 dwt. 22 gr.; total value, £165 10s. 6d."

*Sunrise Mine* (Area, 55 acres 3 roods 12 perches).—This mine, situated on Advance Peak, at an altitude of 5,000 ft., is also owned by the Glenrock Consolidated (Limited), and the operations for the past year are thus described by Mr. Stanford:—

"Since last report a considerable amount of prospecting work has been done by means of cross-cuts to prospect the adjacent country. These have proved that there are two lines of reef running parallel, and about 50 ft. apart, both carrying gold wherever they have been struck, but nothing of value for milling purposes has yet been disclosed. The workings are very close to the cap of the reef, and the whole country is very much broken and disturbed. At the present time we have four men employed driving the lower level ahead westwards, and are constantly picking up patches of gold as we proceed. The former proprietors of this property—the Sunrise Lease Gold-mining Company (Limited)—succeeded in extracting 1,207 tons of golden quartz, which yielded in the mill 1,018½ oz. gold, value £3,909, and all the creeks below this reef have been sluiced with excellent results, and a great deal of the gold which was recovered in the ripples was found to be adhering to little bits of quartz. The Glenrock Company are at present considering the advisability of putting in a new low-level adit some 1,200 ft. below the present lower tunnel. The length of this proposed new tunnel will be 3,000 ft. The cost is estimated at £6,000. The line of this proposed tunnel crosses several other lines of reef, one of which, at any rate, shows gold freely on the surface."

*Tipperary Mine* (Area, 105 acres; owners, Westralia and New Zealand Gold Explorers, Limited).—Mr. Stanford, the general manager, gives the following account of the workings for the year ended the 31st March last:—

"An account of this company's operations during the past year will be of interest. At the date of your visit, 25th February last, there were two main works in progress—viz., driving on the line of reef westwards from the low-level adit, and the sinking of a shaft below the same level. There were also men employed driving No. 7 level westwards 66 ft. above the low-level adit, and also a few men taking a stope off a block of stone in the low-level adit. The west drive in the low-level adit measured 447 ft. on the 26th February, and the No. 7 level face is 76 ft. behind it. The shaft was down 76 ft. at that date. The result of last year's operations was most disappointing to the company's shareholders. Gold was obtained to the value of £3,689 13s. 8d. (being mill gold, 785½ oz. from 1,501 tons, and 206 oz. from 137½ tons concentrates), while the expenditure was



£5,123 7s. 4d., thus showing a deficit of £1,433 14s. 3d. The gold apparently occurs in chutes, which, unlike the chutes in the Glenrock Mine (which have a pitch of about 1 in 4), extend almost vertically up and down through the reef, and, so far as the present works extend, these chutes have been very patchy. The shaft is being sunk on one of these chutes, and so far the stone in it is very patchy, but now is showing signs of improvement. In the face also of the west drive there is now a splendid block of quartz 5 ft. in width, and apparently rich in gold—in fact, since taking charge of the mine in 1893 I have not seen anything better. No new works in connection with the mine have been executed since your last report. At the date of your visit you complained of the ventilation of the mine; you happened to strike it on a bad day. Mr. Hayes, on page 157 of the 'Mines Record,' for November, 1896, speaks of it as quite sweet, and it is only on a very odd occasion that there is any difficulty with the air. With a low glass and the wind south-west the air is often a little dull in the mine, but as our prevailing winds are north-west to north-east very little trouble is experienced, and all this past week the air has been excellent. However, immediately after your visit I took four men off other work, and have put them to push through to the surface for ventilation. This is, however, a very big job. We have to drive No. 6 level (which is 90 ft. above No. 7 level) a distance of about 500 ft. eastwards from its present position, and then rise 170 ft. to the surface. This will take time, but it will be pushed on as quickly as possible."

*Victor Emmanuel Mine.*—Very little work is done here, the owner, Mr. Farrell, employing two men in prospecting.

#### *Skipper's Creek, Bullendale.*

*Achilles Mine* (Area, 125 acres).—This mine is worked and owned by an English company. The manager, Mr. Frederick Evans, is assisted by Mr. Murray Russell, underground boss. The mine was worked from a shaft 150 ft. in depth. A cross-cut, 86 ft., at this level connects with an incline, 280 ft., leading to No. 5 level. A winze is being sunk from this level. The whole of the pumping and winding is done by compressed air. Stopping is carried on in both the north and middle lodes at No. 5 level, the reef averaging 6 ft. in width. A new underlay shaft is now nearly completed. This has been sunk to the adit level 126 ft., to No. 2 level 160 ft., to No. 3 level 86 ft., and No. 3 to No. 4 level 90 ft., and to No. 5 level 90 ft. It is impossible to use the shaft, which is only 12 ft. by 4 ft., for both pumping and winding, but it is expected that the water can be raised in trucks or tanks made for the purpose. The pump is driven by wire-rope gearing. A new Pelton has been erected, the water being supplied from a race recently constructed from Skipper's Creek, at the foot of Mount Aurum. This race is capable of carrying six sluice-heads of water, but one head and a half will be sufficient for all present requirements, the pressure being 340 ft. The quartz is delivered into a bin, holding 100 tons, constructed above the adit, and from thence is carried on a tramway to the stone-breaker, which is placed over another bin immediately behind the battery capable of holding 400 tons. The battery consists of thirty stamps, 7 cwt. each, five stamps to each of the six boxes. The ore is fed from self-feeders constructed on the manager's own plan. The tables are divided into three sections, each strake being covered with green baize, which has been found more suitable than the ordinary blankets in general use. The length of each strake is 16 ft. From 40 to 60 per cent. of the gold is found in the stamp-boxes, and no quicksilver is used either in the boxes or on the tables. The baize is washed as often as found necessary, and the concentrates are treated in an amalgamating-barrel of 1 ton capacity. Each charge requires sixteen hours' treatment, with 100 lb. of mercury in the barrel. The concentrates, after passing through the barrel, are stacked for further treatment. The tailings, after passing over the baize, are allowed to run to waste, assays made showing that only a very small percentage of gold escapes; they are of no appreciable value. The reefs in the mine are three in number, bearing east and west, and having an easterly underlay where most highly gold-producing. The electric power derived from the left-hand branch of Skipper's Creek is at present used in driving two air-compressors and as an auxiliary to the battery when water is scarce. The battery is now driven by the water used for driving the pump machinery, the fall being from that point 140 ft. A 5 ft. Pelton is used. Eighty men were employed in mine and battery, &c., at 23rd March.

#### *Shotover.*

*Gallant Tipperary Mine* (Area, 46 acres).—This mine has lately changed hands, the former company having gone into liquidation, and the property consequently sold. As I did not visit the place during my visit to the Shotover district, in consequence of the uncertainty of finding any one on the mine, I requested the manager to inform me what was being done, and he has written as follows:—

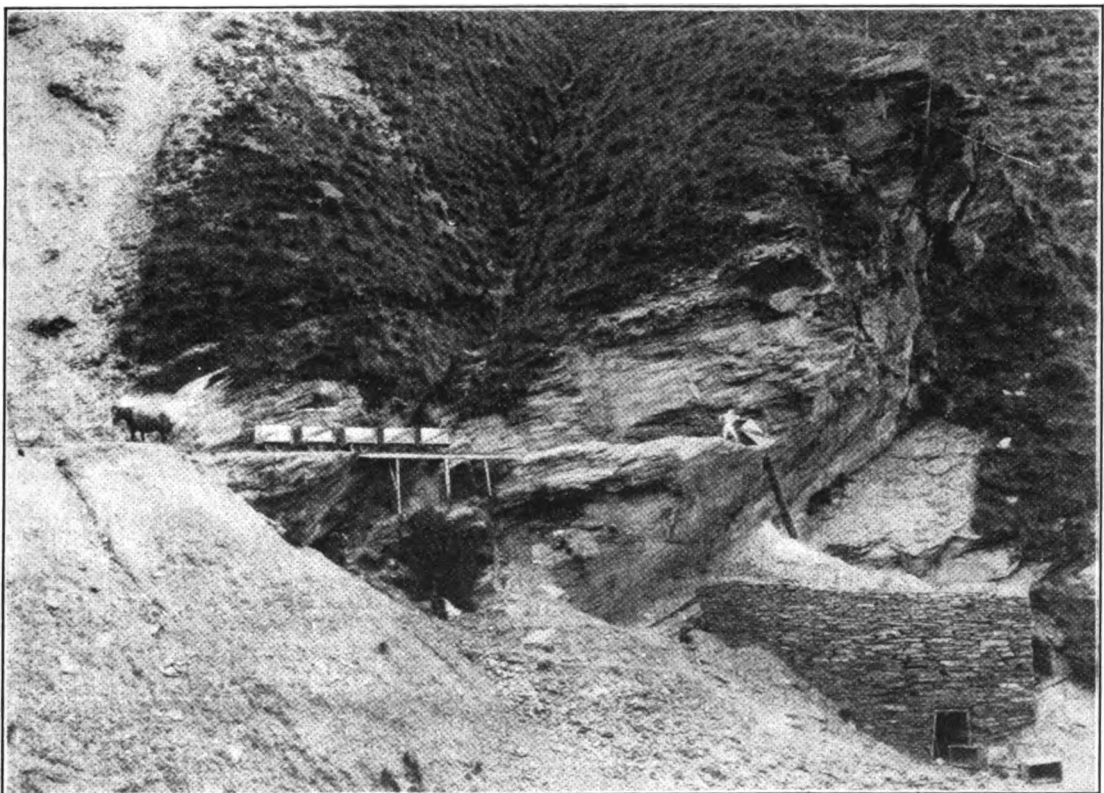
"In reply to your letter addressed to the mine-manager of the Gallant Tipperary Company, I beg to state that the Gallant Tipperary Company went into liquidation, the property was sold, and the purchasers floated it into a new company, called the Shotover Quartz-mining Company (No Liability). The new company commenced operations on the 1st January, 1898, and I attach herewith a report of work done, &c., to the 31st March, 1898. As I have only recently taken charge, I have not yet been able to complete the survey, and cannot, therefore, forward you a plan.

"*Shotover Quartz-mining Company (No Liability).*—This company acquired the property of the Gallant Tipperary Company, consisting of a special claim of 46 acres, situated near Skipper's Point, on the Shotover River. The machinery on the ground consists of a twelve-head battery, driven by a Pelton wheel. The water for motive-power is derived from two creeks on the opposite side of the river, carried in races two miles in length, and delivered into pipes with a head of 250 ft. The former workings were confined to the northern portion of the property, and, the levels there having fallen in, this company decided to proceed with and open up from the machine level. This level had been driven a distance of 184 ft. to connect with a pass, for the purpose of conveying stone to the battery from the upper workings. This machine level is about 50 ft. above the Shot-



McEachen, Photo.

**Premier Mine, Macetown, Otago.**  
Entrance to Low-level Adit.



McEachen, Photo.

**Premier Mine, Macetown, Otago.**  
Trucks emptying at Paddock. Paddock-full holds 300 tons.



over River, and on a level with the battery. It is being driven on the eastern line of reef, and will open up the country at a depth of 315 ft. below the old workings, and at the northern end of property will give a total height of unworked ground overhead of 870 ft. The new company commenced operations on the 1st January, 1898, and up to the 31st March had driven a further distance of 100 ft., making a total of 284 ft. Besides driving, the company intend cross-cutting in order to open up the other reef formations, and thus thoroughly test the property as they proceed. So far the ground opened up has not proved payable, but, as the portions worked by the old company yielded upwards of forty-eight thousand pounds' worth of gold, the new company have every confidence that their efforts will ultimately be successful."

#### *Carrick Range.*

*Golden Gate Claim* (Area, 100 acres).—This claim is owned by the Golden Gate Quartz-mining Company, of Bannockburn. The entrance to the mine is by a low-level adit above the left-hand branch of Pipeclay Creek. The reef consists in part of quartz highly oxidized, and also in portions of a more refractory character, the average width being about 16 in. The underlay is 1 in 3½. A trial crushing of some of the stone gave a yield of 12½ dwt. of gold per ton. A small battery of two stamps is driven by water-power. There is also another reef which was worked on several years ago from a tunnel some distance further up the creek, and it is intended to again open out on this reef, which is about 2 ft. 6 in. in width. Six men were employed.

*Young Australia Claim.*—This is owned by Messrs. McCabe and Sons. The low-level tunnel has been driven 380 ft., and about 300 ft. is still to be driven to cut the reef which was worked from a higher level—90 ft. higher—about twenty years ago. A shaft had been sunk to work the reef, but had to be abandoned, on account of the water proving too much for the machinery then employed. The low tunnel will drain a considerable area of the reef, which underlies 1 in 3, and is 5 ft. in width; and the owner states that former crushings gave 1½ oz. of gold to the ton. A five-stamp mill, driven by water-power, can be used for crushing. All work has been stopped from want of funds.

*Lawrence's Mine, Day Dawn* (Area, 8 acres; owner, James Lawrence).—This mine still continues to produce fair returns. 782 tons crushed yielded 143 oz. 1 dwt. of gold. The battery consists of four stamps.

*Star of the East Mine* (Area, 6 acres).—This mine is owned and worked by the Lawrence Brothers. 170 tons of quartz crushed yielded 57 oz. of gold. There is a battery of ten stamps, driven by water-power. Work in this and the Day Dawn Claim is chiefly done by the owners and three wages-men.

#### *Bendigo.*

*Cromwell Goldfields Company (Limited)* was, in the early part of this year and up to the present, worked by a party of ten tributers, who are working a block of stone at the 200 ft. level in the old shaft, to which access is obtained through a level driven on the line of the reef. The principal shaft is 14 chains east of the old shaft, and has been sunk to a depth of 520 ft., and the water is raised by an 8 in. pump. There are two plungers and a draw-lift required to raise the water to the surface. The reef is about 2 ft. wide in the cross-cut driven to the southward, although in some of the portions formerly worked the stone was 10 ft. in width; but the experience is that the thickness of the quartz is variable. The reef splits between the two shafts, and it is in the north part where the present tributers are working, the yields of gold exceeding 2 oz. per ton, valued at £3 15s. per ounce. A second party of tributers will start work from the main shaft. The machinery employed is not of an up-to-date kind, and great expense is incurred in pumping and hauling, and from the contour of the country it would appear that an adit from the surface could be driven to drain the mine from the 500 ft. level of the shaft. If this work is carried out the mine could be worked at much less expense, and the appearance of the stone at the workings would warrant the adoption of this method of opening up and working this mine. The present battery consists of twenty stamps, of 7 cwt. each, and four berdans, driven by water-power. Fourteen men were employed in mine and battery. Mr. F. Evans, manager of the Achilles Mine at Skipper's Creek, gives the following account of this mine:—

"This mine has been in work more or less for thirty years, the reported yield of gold being given as £500,000. The run of gold along the surface is 1,000 ft. long, going to a depth in one place of 420 ft., at which depth oxidation disappears, no gold being found below this, although the main shaft has opened the 520 ft. level, at which point the lode has been driven on 400 ft. Lode small, with rugged walls, composed of hard schist: lode matter, clay and little quartz. The lode is undermined by a slide, and until the exploration is carried below this there is not much chance of the run of gold reforming. The mine has been in the hands of a liquidator for some considerable time, but I am led to understand that a new company is in treaty to purchase, for the purpose of further developing the property. At present the mine is working on tribute with good results. The tribute received by the owners is 30 per cent. on 1 oz. per ton, and 1½ per cent. on each pennyweight above that up to 2 oz. per ton."

#### *Old Man Range, near Bald Hill Flat.*

The *Excelsior Mine*, also known as Gray's Reef, is situated on the slope of the Old Man Range, about 3,000 ft. above sea-level, and has been in operation about seven seasons. The crushing season extends from the 1st September till the 1st June, the water during the remaining three months being frost-bound. This lode was discovered by two men, one of whom still holds the property. When gold was first discovered ground-sluicing was the method of working adopted, and, although the quartz is of a most friable nature, containing a quantity of free gold, still it is estimated that at least three-fifths of the gold contained in the stone was lost by sluicing the quartz down the steep faces into the creek below. After two or three seasons of this wasteful method of working a small battery of three 300 lb. stamps was obtained, and the claim worked

by the ordinary methods of stoping out the reef and crushing the quartz. Up to the present time gold of the value of £9,800 has been taken out of the reef during the seven seasons worked, for an outlay averaging a little under four men's wages during the time worked. The gold is of high quality, being worth £3 19s. to £4 per ounce. Although the situation of the mine is such that it could be opened by a low-level adit, very little has been done in this direction to open up the mine, most of the work done being by shafts, where the lode has been followed from the surface downwards, the stone being raised by hand and afterwards sledged to the battery. A level is being driven to tap the blocks of stone known to exist at a depth of from 70 ft. to 120 ft. below old workings. This level is now within 150 ft. of the lode, and is being pushed on as circumstances will allow. Two reefs of quartz are worked, running east and west, with a southerly dip, the chutes of gold having a slight dip to the west. The two lodes vary in their distance from each other, in some parts being 50 ft. in other places 10 ft. to 12 ft. apart. Where so close as this they form one big lode. The quartz is commonly of a friable character, and the gold, although fine, is distributed generally through the stone. It takes a little more than 1 dwt. per ton to put the stone in the battery when raised to the surface, an expense which will be abolished when the level is completed. The mode of saving the gold consists of using mercury in the stamp-box and about 3 ft. of copper-plates, no blankets being used, as the plant does not include any means for the treatment of blanketings. During the twelve months ending the 31st March, 1898, which only includes nine crushing months, eight hundred pounds' worth of gold was obtained, four men and a boy being employed. Included in this was the driving of the adit level a distance of 35 ft., and the sinking of air-shaft a further 70 ft., connecting the adit with the surface; also the shifting of battery and laying down tramway, and other work of a developing nature. No explosives are required to mine the lode stuff, as it yields to pick and gad, timber, however, being a fairly heavy item of expense. The power for working the battery is obtained from a small Pelton wheel driven with a direct fall of about 100 ft. A great drawback in the working of the mine has been the want of a road from the main road to the workings. This is gradually being overcome, however, the owner spending some time on it every season, and the claim can now be reached by bullock teams halving their loads. The average number of men employed for year was four and a half.

*White's Reef Claim* (Area, 44 acres).—This mine continues to yield quartz of a payable kind. The workings are chiefly in shafts sunk to a moderate depth, with levels driven between the shafts. The runs of gold are, however, extending downwards. The battery consists of five stamps, and at the time I was in the district, on the 11th March, the owners were engaged in removing it further down the hill, in order to get advantage of the limited water-supply for power. 160 tons of quartz yielded 143 oz. 6 dwt. of gold.

*Eureka Quartz-mining Company, Ophir*.—This company was formed to undertake prospecting operations on a reef discovered in 1896 by W. Green, who had sunk to a depth of 23 ft., the reef increasing in depth as he descended. The line of reef is east and west, with little dip. Stone was taken out for a distance of 120 ft., at varying depths, and a trial crushing of 73 tons gave a return of 40 oz. 10 dwt. 11 gr. It was subsequently decided to sink a shaft on the same line of reef, and at a depth of 70 ft. it was found that the reef had widened. Sinking was carried on to a depth of 100 ft., and thence a drive of 14 ft. was put in to follow the line of reef, and a cross-cut of 28 ft. made to the north. Owing to financial difficulties, work was suspended, but the promoters entertain hopes of eventually making the property a success.

#### *Macrae's Flat District.*

*Golden Point Claim* (Area, 60 acres; owners, William and George Donaldson).—The workings are on the surface. A flat seam lying under alluvial drift and surface soil is denuded by hydraulic pressure. The loose material, being washed through sluice-boxes, yields alluvial gold. The quartz, which is of a firm friable nature, is conveyed by aerial tramway to the mill and crushed. The mill consists of one stone-breaker, one 5 ft. Huntington roller-mill, and two 3 ft. 6 in. Wheeler's pans, and is driven by a Pelton wheel. The water-race is four miles in length, costing £400. The mill machinery also cost £5,000, and the ore-bins and aerial tramway £200; total, £5,600. The quantity crushed was 130 tons, yielding 32 oz. 16 dwt. of gold; value, £127. Six wages-men are employed.

#### *Barewood District.*

Lyder and party, of the Golden Burn Company, have claims on the Taieri River. A battery of ten head of stamps is on the ground, and considerable prospecting and development work has been done. The lode averages about 5 ft. in width, but is impregnated with arsenical pyrites, for the elimination of which additional plant will be required.

*Barewood Mine*.—Prospecting operations have been energetically carried on during the past year on this property by the Anglo-Continental Gold Syndicate and the London and New-Zealand Exploration Company, who are jointly interested in the venture. Three shafts have been sunk, 12 ft. by 4 ft. in the clear inside the timber, to a depth of a little over 200 ft. These shafts are on different sections of the property, along the line of reef, and are about 40 chains apart, so that the reef will be tested at different points. At Scott's Gully a level was driven on the lode from the shaft at a depth of 100 ft., and stone of a payable character for working found at that level. A cross-cut has been driven from the shaft at 200 ft., and the lode cut through, where it shows a width of 8 ft. of lode matter between the walls, but in this width there is about 5 ft. of mullock and quartz, which contains but very little gold. It is, however, satisfactory to find the width between the walls of the lode continues to be the same as it was on the 100 ft. level. A commencement is now made to drive on the line of reef on each side of the cross-cut at the 200 ft. level. One of the shafts is sunk on what is known as Ryley's Claim, and a commencement is now being made to drive a cross-cut from the shaft to cut the reef at a depth of 200 ft. The reef was said to be worked to a depth of 140 ft. by the former proprietors from an old shaft which was sunk on the underlie of the lode, but this shaft was in a very bad state of repair, and full of water, at the time the English

companies took an option of the property, and they decided to sink a new shaft on the line of tunnel laid off to cut and drain the reef to a depth of 600 ft. below the surface. This new shaft is about 5 chains to the southward of the old shaft, and about 300 ft. to the eastward of the outcrop of the reef on the surface, the position of the shaft being laid out so as to cut the lode in the shaft at a depth of about 300 ft., the underlie of the lode being about 45° to the eastward.

Another shaft is sunk on what is known as Cunningham's Section, about 40 chains south of Ryley's shaft, and a cross-cut is now being constructed from this shaft to cut the lode, which is estimated to be about 75 ft. to the westward from the shaft. Considerable difficulty was experienced in sinking this shaft, on account of the quantity of water there was in the ground, and the temporary appliances which were used to cope with it.

At the time the English companies took an option of purchase of this property there were a good many old small pumps and pipes on the property, and these have been used as far as possible to test the ground before expending any money in purchasing efficient drainage appliances.

#### *Flat Stream.*

*Caledonian Mine* (Area, 100 acres; owners, Caledonian Gold-mining Company, Limited).—The mine is opened by drives 300 ft. long put in during the year. The reef, which is from 2 ft. to 8 ft. in width, is of a well-defined character.

#### *Table Hill District (Milton).*

*Canada Mine* (Area, 47 acres; owners, Robert Andrew, T. J. Ritchie, and John Lawson).—This mine has been purchased by the present owners during 1897. They have driven an adit level now 646 ft. in length. A cross-cut has been driven from this adit a distance of 140 ft., and they expect to cut the reef within 20 ft. of further driving. A ten-head stamp-mill is now completed, and will be driven by a turbine.

The Burnt Creek Quartz-mining Company own a property about fourteen miles from Waitahuna. On the mine they have a battery of ten stamps, driven by a turbine, and, as a considerable quantity of ore is in sight, crushing operations will shortly be commenced.

#### *Lawrence.*

*Gabriel's Gully.*—Operations have been resumed by the Gabriel's Gully Prospecting Association to explore a reef formerly worked between the Blue Spur fault and the cross-course. A tunnel was driven at a low level, and the reef proved to be only a few inches wide. The drive was then continued, with the object of picking up the reef beyond the cross-course, but so far without success. Operations were subsequently carried on in driving alongside the cross-course. Some bunches of stone have been got, which may lead to further discoveries being made.

*O.P.Q. Quartz-mine, Waipori* (Area, 76½ acres; owners, O.P.Q. Waipori Gold-mines, Limited).—The work at present being undertaken includes the sinking of a new shaft 12 ft. 6 in. by 4 ft., which has now reached a depth of 150 ft., and is well timbered, and in three compartments; driving a tunnel on line of reef, now 450 ft. in; the extension of the old tunnel on lower level, which has reached a distance of 790 ft.; and also the erection of a battery, &c. The low-level tunnel is intended to form an adit for the outlet of water from the pumps. It is intended, at 250 ft. in depth, to commence a level from the shaft. The shaft will, however, be sunk until a depth of 500 ft. is reached. An order for winding plant, &c., has been placed with Messrs. Robey and Co., Lincoln, England. Twenty-six men are employed.

*Longwood Mine* (Owners, Longwood Quartz-mining Company).—The tunnel for which subsidy has been received has now reached a distance of 950 ft., but the reef has not yet been struck. The tunnel is in good order.

#### *Riverton District.*

A shaft, which has now reached a depth of 32 ft., is being sunk at South Riverton, with a view of proving a reef which, it is said, has been traced for a very considerable distance on the surface. The Riverton Prospecting Association is in charge of the works.

#### *Wilson's River.*

*Golden Site Extended Mine* (Area, 144 acres and 3 perches; owners, Golden Site Extended Gold-mining Company).—This company took over the property of the old company, and are carrying on work to search for the reef previously lost sight of. As it was out of my power to visit the district, Mr. W. Wylie, the mine-manager and engineer, has supplied the following account of the mine:—

"During the past year a shaft has been sunk on north side of river. The shaft is 210 ft. deep, divided into three compartments, 4 ft. by 4 ft., timbered throughout with 8 in. by 3 in. timber. At 200 ft. a chamber has been constructed 7 ft. high the full length of the shaft, and extending back 15 ft. From end of chamber a drive was put in 63 ft., when the hanging-wall of what is supposed to be the old Site reef was met with. The drive has been carried along the wall referred to in a southerly direction till a point was reached where the reef formation (known as the new reef at river-level) was met with. The drive has been continued along the foot-wall of the above-named formation. In driving the last 60 ft. a considerable amount of quartz has been met with. As yet it does not carry gold. In addition to the above work, sundry short cross-cuts have been put in, making about 400 ft. driven in all. Owing to the collar of the shaft being nearly 50 ft. above river-level, an adit has been driven 70 ft. long to connect with shaft. A Pelton wheel outside is used to work the pump, which is 6½ in. diameter, and 2 ft. 8 in. stroke. Flat rods connect with a bob fixed in chamber at site of shaft. The pump-rods are Oregon timber, 3 in. by 3 in. Permanent iron-runged ladders, in stages of 15 ft., have been fixed in shaft, tops of ladders at stages being provided with good hand-holds. Substantial poppet-heads have also been erected, the whole being covered in to protect the braced man from the weather. A battery of ten 6 cwt. stamps and two berdans is also erected, to be driven by water-power. About 40 chains of water-race are formed, carrying five sluice-heads of water. This will prove sufficient to drive the machinery for pumping, winding, and crushing. Two Pelton wheels are used. Fourteen men were employed."



*Preservation Inlet.*

**Alpha Mine.**—In January last the manager, Mr. John Wilcocks, reported that the track from the mine to the Government tram was completed, and he anticipated getting a stamp battery on to the ground in a few days, and that crushing would be started in the course of three months. The shaft, which is 10 ft. by 4 ft. in diameter, was down 80 ft., and it was proposed to sink a further depth of 50 ft. before opening out. Stone was met with at a depth of 30 ft., which gradually increased in size till it was the full length of the shaft. The stone was over the average quality. It is proposed to erect another ten head of stamps should the prospects of the mine equal anticipation.

**Tarawera Claim.**—This claim has a good-looking reef, 4 ft. in width, on which it is proposed to sink at the 80 ft. level.

**Cuttle Cove.**—Operations are being carried on here to get out a trial crushing of stone.

Prospecting has been discontinued at the Olivia Claim, as the reef was not found at a distance where it was expected, but the directors intend to start again in the course of a few weeks.

Attention is being paid to the reef situated at Cuttle Cove.

**Golden Site Mine.**—Driving has been carried on on the 200 ft. level, and a considerable amount of quartz met with. The walls are not well defined, but it is hoped that they may improve as the driving proceeds. An uprise will be put in from the 200 ft. level, operations on which will shortly be started.

**Morning Star Gold-mining Company, Te Oneroa.**—The mine-manager, Mr. J. E. Davis, reports progress in this mine to the end of 1897:—

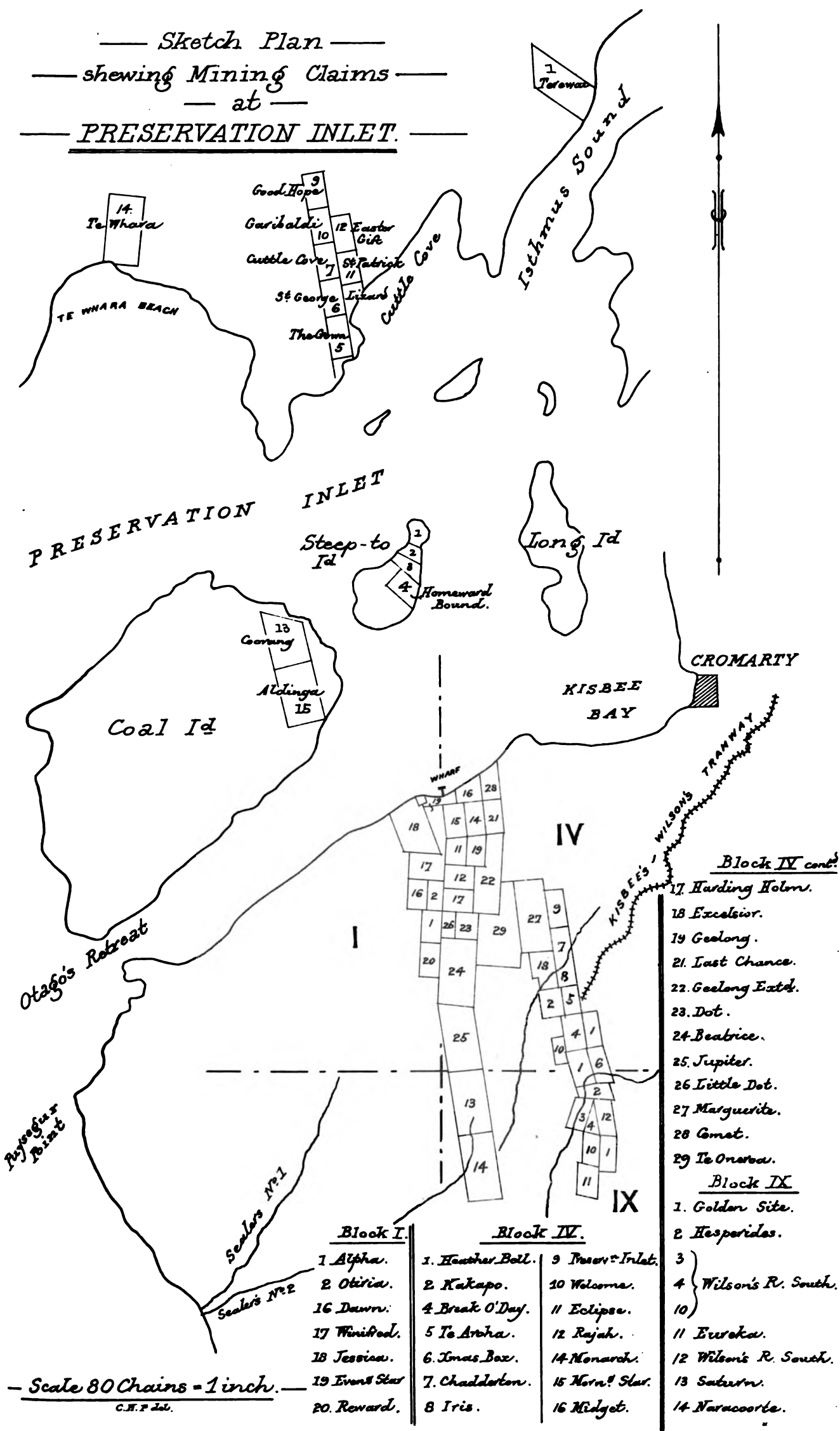
The No. 1B is a new level, and was started in September last, and is driven 121 ft. I am driving on the reef formation, but do not expect to get any stone until in past the last rise put up to this level from No. 1A, in about six weeks, when I expect to pick up the old shoot we were working on in the level below. The No. 1A level has been driven 239 ft. There has been no payable gold in this level since October, when the line of reef changed its course to the west. It has now returned to its old course to the south, and, by the appearance of the walls, everything looks as favourable as hitherto for a gold-bearing formation ahead. There have been two rises put through from this level to No. 1B, 156 ft. in height; the first one carried payable stone up to 60 ft., and the second one up to 146 ft. I have stoped out above No. 1A 36 ft. 6 in. in height, 160 ft. in length between mouth of tunnel and first rise; this is getting shorter every stope. Between first and second rises 23 ft. in height, 170 ft. in length; south of second rise, 29 ft. in height, 75 ft. in length. No. 1 level has been driven 19 ft. 10 in., and discontinued since July. It will have to be pushed forward to get at the stone overhead. I have a rise through south of the mullock-bank to No. 1A level. At 80 ft. I met with payable stone, and it has continued the same up through. This stone is looking very well, and is yet to be taken out. I have stoped in this level north of the mullock-bank to rise through to No. 1A 50 ft. in height, 170 ft. in length. This is where the most of the gold has come from this last six months. I have just finished taking out the floor of No. 1A level, which completes this stope. As the new tunnel at the entrance of this level was getting useless, a contract for a new one was let and finished—total distance, 264 ft.—and connected with old level at No. 1A rise. Nothing has been done to the No. 2 level. A winze has been started 70 ft. from south face, and is down 177 ft.; there was a little gold at starting; after that I could only find a trace. I have started to open out at the 120 ft. level to drive south. No. 3 cross-cut has been driven 32 ft., but is not in far enough to cut the Morning Star line. I have no payable stone in any of the faces of the levels, but the stopes for this last six months have turned out more stone and gold than I expected, and what I have left in the stopes will, I think, carry me on to Christmas, 1898, and may be poorer or richer, but to all appearances will go about the same, although the daily returns from the battery at present are not so good. The battery is working well, and in good order.

**Jessica Mine.**—A tunnel is being put in, which is intended to be 200 ft. in length.

*Summary of Returns from Quartz-mines for Year ending 31st March, 1898.*

Name of Company.	Ordinary Quartz crushed.		Retorted Gold.		Estimated Value.
	Tons	cwt. qr.	Oz.	dwt. gr.	
Achilles Goldfields (Limited), Bullendale ...	6,491	0 0	4,436	0 0	£67,900
Glenrock Consolidated (Limited), Macetown ...	4,545	0 0	3,196	13 0	
Westralia and New Zealand Explorers (Limited), Macetown	1,149	0 0	507	5 0	
Morning Star Gold-mining Company, Preservation Inlet	3,654	0 0	5,384	11 0	
Cromwell Goldfields (Limited), Bendigo ...	1,123	10 0	2,457	0 0	
Lawrence Brothers, Bannockburn ...	782	0 0	143	1 0	
James Lawrence, Bannockburn ...	170	0 0	57	0 0	
Golden Gate Gold-mining Company, Bannockburn ...	176	0 0	95	0 0	
F. W. Gray, Bald Hill Flat ...	177	0 0	244	10 0	
R. T. Symes, Bald Hill Flat ...	160	0 0	143	6 0	
Phelan Brothers, Macrae's ...	60	0 0	91	0 0	
W. and G. Donaldson, Macrae's ...	130	0 0	32	16 0	
H. N. Mills and Sons, Nenthorn (for sundry parties) ...	370	15 0	329	13 0	
F. H. Perry, Rough Ridge ...	60	0 0	15	0 0	
H. F. Knight, Long Gully, <i>via</i> Waipori	12	0 0	3	8 0	
Mount Highlay Syndicate, near Hyde ...	760	0 0	165	15 16	
Totals ...	19,820	5 0	17,301	18 16	...

— Sketch Plan —  
 — shewing Mining Claims —  
 — at —  
PRESERVATION INLET.



Block IV cont.

- 17. Harding Holm.
- 18. Excelsior.
- 19. Geelong.
- 21. Last Chance.
- 22. Geelong Ext'd.
- 23. Dot.
- 24. Beatrice.
- 25. Jupiter.
- 26. Little Dot.
- 27. Marguerite.
- 28. Comet.
- 29. Te Ononua.

Block IX

- 1. Golden Site.
- 2. Hesperides.
- 3. }
- 4. } Wilson's R. South.
- 10. }
- 11. Eureka.
- 12. Wilson's R. South.
- 13. Saturn.
- 14. Naracoorte.

Block I.

- 1 Alpha.
- 2 Otiria.
- 16 Dawn.
- 17 Winiroa.
- 18 Jessica.
- 19 Even Star.
- 20. Reward.

Block IV.

- 1. Heather Bell.
- 2. Kakapo.
- 4. Break O' Day.
- 5 Te Araroa.
- 6. Tinas Box.
- 7. Chadderton.
- 8 Iris.
- 9 Preserv. Inlet.
- 10 Welcome.
- 11 Eclipse.
- 12 Rajah.
- 14 Monarch.
- 15 Horn Star.
- 16 Midget.

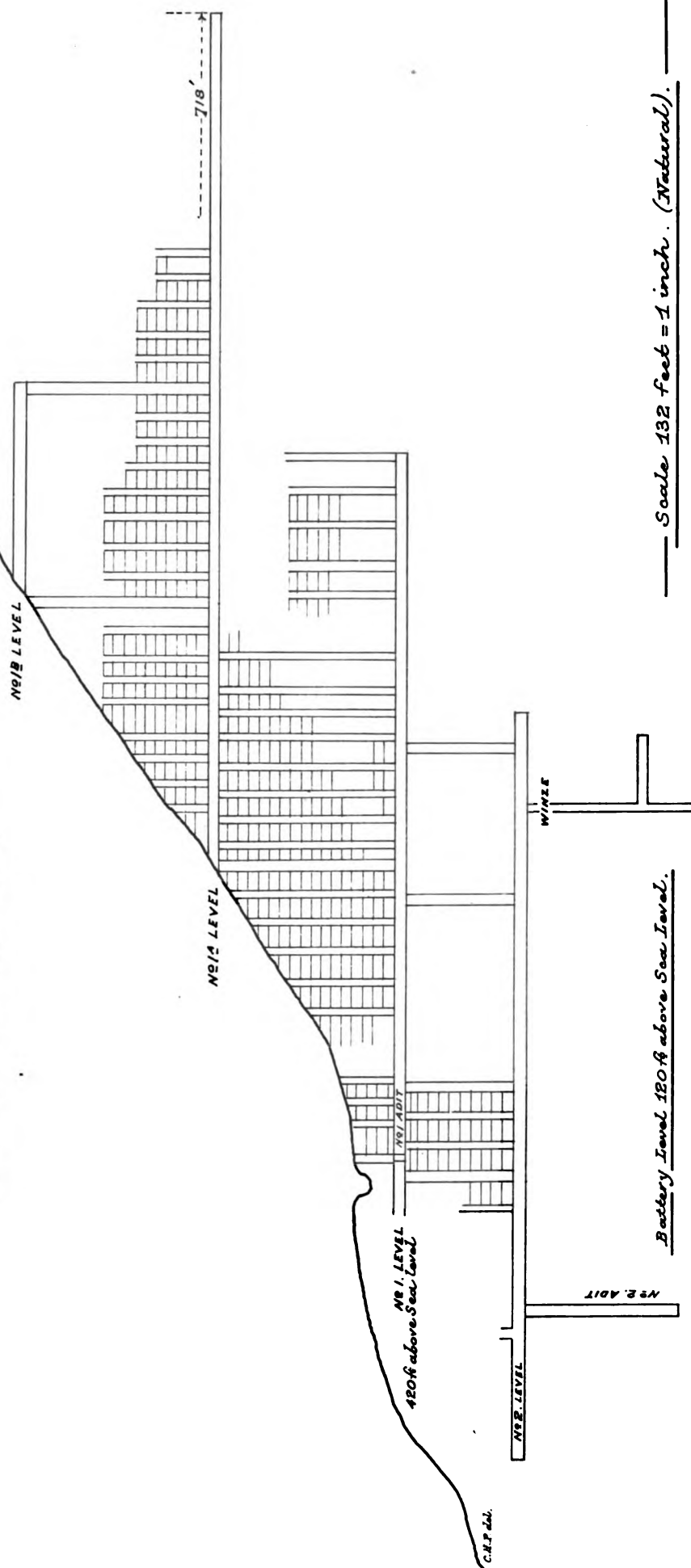
— Scale 80 Chains = 1 inch. —  
 C.H.F. del.





—Longitudinal Section of Workings.

1150 feet above  
Sea level.



- Scale 132 feet = 1 inch. (Natural).



*Tailings treated.*

	Quantity.	Yield.	Value.	Remarks.
	Tons cwt.	Oz. dwt.	£ s. d.	
Glenrock Consolidated (Limited), Macetown ...	48 0	...	563 7 3	Cyanide.
Westralia and New Zealand Gold Explorers (Limited), Macetown	135 10	...	546 14 6	Roasting and cyanide.
Morning Star Gold-mining Company, Preservation Inlet	Not stated	139 4	500 0 0	...
Cromwell Goldfields (Limited), Bendigo ...	89 0	7 0		
F. H. Perry, Rough Ridge ...	16 0	3 0		
	288 10	149 4	1,610 1 9	...

The foregoing summary of returns from the different mines shows that 19,820 tons of quartz were crushed for 17,301 oz. 18 dwt., valued at £67,900; and 288 tons 10 cwt. of tailings were treated for a yield of gold valued at £1,610 1s. 9d.: total value, £69,510, compared with £40,000, the estimated value for last year, showing the increase in value to be £29,510. The increased returns are chiefly from the Glenrock and Westralia Mines, at Macetown, the Cromwell Mine, at Bendigo, and the Achilles Mine, Skipper's. A continuation of payable returns is to be expected from the Macetown district, the mines being better developed each succeeding year, and probably the Achilles Mines, after the dead-work is finished, will maintain yields equal to the past. The success at the Cromwell is due to exploration on the part of the tributers. The Morning Star Mine has got payable ore in sight, but it is questionable whether exploration work is sufficiently advanced to enable returns like those mentioned to be maintained.

On the whole, the prospects of success attending mining for quartz in the Otago and Southland goldfields are very good. The exploration work at Barewood, Canada Reefs, Waipori, and Preservation Inlet is being carried on systematically, and in a way to prove the value of those reefs known to exist, some of which have already been proved to produce rich quartz.

The Old Man Range is one of the districts that is well worthy of being still further prospected.

**ALLUVIAL MINING.**

This description of mining comprises the various methods of recovering gold from the beds of streams and rivers by hydraulic sluicing, elevating, and dredging; also, in ground-sluicing and hydraulicking the older accumulations of auriferous gravel, the result of lacustrine, fluvial, and estuarine deposits, or accumulations of morainic matter carried out of the mountainous regions by the action of ice; and latterly, although not to any great extent, mining for the strata of wash now superimposed by later accumulations of the younger drift gravels.

The Middle Island, in the western parts, from Collingwood in the north to Preservation Inlet at the most southerly point, and more to the eastward in central and eastern Otago, has been the theatre of vast geological changes, and many of those deposits of gold-bearing gravels exist at various horizons from below sea-level at Ross, on the West Coast, to Mount Arthur table-land in Collingwood, at an altitude of 4,000 ft., and in Otago from sea-level to elevations of 4,000 ft. at Mount Criffel, Mount Buster, and other mountain ranges. These auriferous drifts, being of so varied a character, and found in such numerous localities, afford material for the operations of the miner in such quantities that, notwithstanding the extensive appliances now used, years must elapse before they can be exhausted.

The following abstracts of claims held under licenses in the Marlborough, Collingwood, and Westland districts show the large area occupied in that way by persons interested in alluvial mining, while throughout the various mining districts a very considerable area is still held by individuals under their miners' rights.

**ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS** issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Havelock.</i>						
30/6/94	A. 4 B. 2 P. 11	Wakamarina ..	..	Wakamarina	The Gorge ..	The Wakamarina Gorge Gold-mining Co. (Ltd.).
30/6/96	30 0 0	" ..	..	"	Quayle's Terrace ..	H. F. Thompson.
1/2/98	30 0 0	" ..	..	"	All Nations ..	All Nations Hydraulic Sluicing Co.
25/2/98	28 0 0	" ..	..	"	New Mentor ..	Thomas Todd.
25/2/98	30 0 0	" ..	..	"	New Midas ..	G. M. Mathieson.
25/3/98	30 0 0	" ..	..	"	Yukon ..	David Girdwood.
30/10/96	11 0 0	Wakamarina River	..	"	Golden Point ..	G. P. Hilton and C. L. Diamanti.
30/10/96	10 0 20	Ditto ..	..	"	Quayle's Terrace ..	Harry F. Thompson.
30/10/96	18 0 0	" ..	..	"	Wakamarina Dredging Co.	Henry D. McKenzie.
24/2/98	12 1 0	" ..	..	"	Croesus ..	Q. J. Scott.
24/2/98	18 2 0	" ..	..	"	Trafalgar ..	William E. Clouston.
24/2/98	0 2 0	" ..	..	"	Hamilton ..	Alfred Rogers.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Collingwood.</i>						
17/2/98	A. R. P. 60 0 0	Aorere River ..	XIV.	Pakawau ..	..	James Hargreaves.
17/2/98	37 0 0	" ..	IX.	Aorere ..	..	John W. Riley.
1/1/86	10 0 0	Richmond Hill	VIII.	" ..	Richmond ..	Parapara Hydraulic Sluicing and Mining Co.
7/6/88	7 1 9	" ..	" ..	" ..	" ..	Ditto.
1/1/92	9 0 0	Glen Gyle ..	IV.	" ..	" ..	W. Bray and another.
4/5/92	20 0 0	Rocky River ..	XI.	" ..	" ..	Parapara Hydraulic Sluicing and Mining Co.
9/7/92	27 1 0	Parapara ..	IV.	" ..	" ..	Ditto.
7/2/94	19 3 5	" ..	VIII.	" ..	" ..	James Reddan.
4/8/96	10 0 0	Victoria Creek ..	III.	" ..	" ..	Rocky River Hydraulic Sluicing Co.
1/12/96	30 0 0	Rocky River ..	XI.	" ..	" ..	Collingwood Gold Fields (Ltd.).
18/6/97	9 3 9	Quartz Ranges	X.	" ..	" ..	Parapara Hydraulic Sluicing and Mining Co.
9/6/94	83 0 0	Parapara ..	I.	" ..	" ..	Collingwood Gold Fields (Ltd.).
7/4/96	100 0 0	Quartz Ranges	XIV.	" ..	" ..	" ..
7/4/96	85 3 5	" ..	X.	" ..	" ..	" ..
7/4/96	68 0 31	" ..	VIII.	" ..	" ..	" ..
7/4/96	48 2 21	" ..	XIV.	" ..	" ..	" ..
7/4/96	46 3 29	" ..	X.	" ..	" ..	" ..
4/5/96	48 3 30	Victoria Creek	IV.	" ..	" ..	" ..
7/12/96	81 1 24	Onakaka ..	" ..	" ..	" ..	F. West and H. P. Washbourne.
1/2/97	50 0 0	Victoria Creek	III.	" ..	" ..	Richard Ellis.
29/3/97	100 0 0	Takaka ..	IX.	Waitapu ..	" ..	H. P. Washbourne.
<i>Motueka.</i>						
16/3/97	30 0 0	Ba'oon Hill ..	V.	Mount Arthur	Table-land Hydraulic Sluicing Co.	C. Lewis and H. P. Washbourne.
<i>Westport.</i>						
20/8/92	31 2 33	Bradshaw's ..	II.	Steeple ..	Bradshaw's ..	Edmund Gillon.
11/3/95	66 2 0	Addison's ..	V.	Waitakere ..	Shamrock Lead ..	The Shamrock Lead Gold-mining Co. (Ltd.).
23/12/96	100 0 0	" ..	IV.	Steeple ..	Addison ..	The Addison Gold-sluicing Co. (Ltd.).
1/2/97	73 1 21	" ..	II.	Waitakere ..	Bendigo Gold-mining Co.	Charles Marina Pielsticker.
22/12/96	99 3 35	" ..	I.	" ..	Golden Lead Gold-mining Co.	Patrick Sullivan.
28/1/97	50 0 0	German Terrace	V.	Kawatiri ..	Rhine and Fatherland Gold-mining Co.	Frank Sontgen.
28/8/93	8 3 0	Addison's ..	II.	Waitakere ..	" ..	Peter Halligan and party.
21/5/94	29 3 27	Bradshaw's ..	" ..	Steeple ..	Catherine Gold-mining Co.	Charles Lind and party.
18/4/95	7 3 9	Addison's ..	" ..	Waitakere ..	Try Again Gold-mining Co.	John Brady and party.
18/1/95	15 1 14	" ..	" ..	" ..	" ..	William Gould and party.
15/5/95	7 1 19	Cascade Creek ..	III.	Ohika ..	Cascade Mining Co.	Robert Button and party.
16/8/95	26 3 14	Addison's ..	V.	Waitakere ..	Shamrock Lead ..	The Shamrock Lead Gold-mining Co. (Ltd.).
22/5/96	17 3 24	Bradshaw's ..	IV.	Steeple ..	South Spit Gold-mining Co.	E. Gellow and J. Collins.
22/12/96	22 0 8	Addison's ..	II.	Waitakere ..	Garryowen Gold-mining Co.	Michael Carmody and party.
28/1/97	15 3 11	Coal Creek ..	VIII.	Kaiwatore ..	Papahau Gold-mining Co.	Charles Feidt and party.
21/7/96	100 0 0	Addison's ..	IV.	Steeple ..	Westport Cement-crushing Co.	Thomas Young.
21/7/96	100 0 0	" ..	II.	Waitakere ..	Extended Londonderry Cement Co.	Stephen Garvin.
11/12/96	98 3 36	" ..	" ..	" ..	Westport Cement-crushing Co.	Jesse King.
26/11/92	28 2 30	" ..	XI.	" ..	Venture ..	The Venture Gold-mining Co. (Ltd.).
18/10/94	9 3 37	" ..	II.	" ..	Piper's Flat Auriferous Cement Co.	John O'Dea and party.
13/5/95	4 2 10	" ..	" ..	" ..	Venture ..	The Venture Gold-mining Co. (Ltd.).
20/4/96	20 0 0	" ..	I.	" ..	Addison ..	Henry Warne.
20/7/96	20 0 0	" ..	II.	" ..	Londonderry Gold-mining Co.	Stephen Garvin and party.
<i>Charleston.</i>						
12/4/90	12 1 0	" ..	VI.	Waitakere ..	Dublin City ..	W. Norris, M. and J. Towhill, and P. O'Connor.
21/11/89	5 0 34	" ..	" ..	" ..	Morning Star ..	P. Dwyer, M. Connolly, J. Gregory, and H. H. Ruiter.
1/12/90	6 0 0	" ..	" ..	" ..	Big Bonanza ..	P. Hanigan.
17/8/93	8 2 37	" ..	" ..	" ..	" ..	Edward McClatchie.
23/11/94	10 3 39	" ..	" ..	" ..	" ..	Thomas Shine.
12/6/95	5 3 6	" ..	I.	Brighton ..	" ..	M. and T. O'Brien.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Charlston—continued.</i>						
20/5/95	A. R. P. 1 0 31	..	IV.	Waitakere ..	..	S. Turner and W. Calvert.
6/7/96	8 1 13	..	VI.	..	..	Thomas Morris and J. Lyther.
9/8/88	8 0 0	Croninville ..	IV.	..	Great Extended ..	M. and J. O'Donnell.
21/10/95	68 0 17	Brown's Terrace ..	..	..	Brown's Terrace ..	William Wilson.
17/2/96	99 2 0	Four-mile ..	VI.	..	Aurora ..	Kastan and Charubin (Germany).
5/2/97	58 2 10	..	IX.	..	Four-mile Gold-mining Co.	..
5/2/97	99 1 20	..	..	..	Empress Gold-mining Co.	..
14/5/97	26 1 0	Nine-mile Beach	III.	..	Totara Gold-mining Co.	John M. Powell.
29/6/97	99 3 0	Charleston ..	VI.	..	Mount Pleasant Ext.	John C. McKerrrow.
17/7/97	50 0 0	Deadman's Creek	IX.	Brighton ..	Deadman's Creek ..	George A. Hart.
29/10/97	50 0 32	Fool's Terrace..	IV.	Waitakere ..	Lucinda ..	A. M. Bourke.
28/10/97	38 1 18	Brown's Terrace	..	..	Lucy ..	..
<i>Lyell.</i>						
17/2/97	99 1 27	Dee Creek ..	VI.	Inangahua ..	Dee Creek ..	Dee Creek Gold-mining Co. (Ltd)
12/3/94	100 0 0	Matakitaki ..	VII.	Matakitaki ..	The Mammoth Hydraulic Sluicing Co.	Thomas George Macarthy.
19/8/97	39 2 34	Marina ..	XV.	Burnett ..	Hector ..	Hector Bates Walker.
19/8/97	29 3 27	..	..	..	Record ..	George Walker.
1/9/97	98 3 0	..	..	..	Ophir ..	George Von Belle and Francis John Walmsley.
17/2/97	10 0 0	Dee Creek ..	VI.	Inangahua ..	Dee Creek ..	Dee Creek Gold mining Co.
14/3/92	5 0 0	White Point ..	XV.	Lyell ..	..	John Fennell and Robert Perkins.
16/1/96	19 0 0	Horse Terrace..	VII.	Matakitaki ..	Tyrone Sluicing Co.	William White.
18/11/97	5 3 33	Three-channel Flat	VI.	Inangahua ..	Jubilee ..	Matteo Della Vedova.
20/1/98	10 0 0	Dee Creek ..	..	..	Dee Creek ..	Dee Creek Gold-sluicing Co.
20/1/98	3 0 28	Marina ..	XV.	Burnett ..	Drover ..	George Walker.
22/5/96	42 2 32	Fern Flat ..	XVI.	Lyell ..	Buller ..	The Buller Gold-dredging Co. (Ltd.).
19/8/97	47 0 0	..	..	..	Central Buller ..	Smith Langton Patrick Free.
18/11/97	70 2 21	..	XIII.	Matiri ..	North Buller ..	Bernard Patrick McMahon.
<i>Greymouth.</i>						
21/8/88	13 2 22	..	XVI.	Greymouth ..	..	Druce and party.
29/9/90	10 0 3	..	(XIV., XV. III., IV)	Waimea ..	..	John Byrne.
13/10/88	2 0 0	..	..	Hohonu ..	..	Claus H. Linz.
21/12/96	49 0 6	..	XII.	Greymouth ..	..	John Druce.
7/12/96	35 2 11	..	III.	Waimea ..	..	H. J. Wickes.
1/6/97	100 0 0	Barrytown ..	IX.	Waiwhero ..	Barrytown Flat ..	Barrytown Flat Gold-mining Co. (Ltd.).
1/6/97	92 2 12	..	..	..	..	Ditto.
10/7/97	37 3 18	Paroa ..	III.	Waimea ..	Golconda ..	J. D. Gilles.
1/6/97	50 0 0	Fourteen-mile North Beach	I.	Te Miko ..	Pactolus Gold-mining Co.	Peter Wilson and William Campbell.
3/8/97	100 0 0	Barrytown Flat	..	Waiwhero ..	Inverness Gold-mining Co.	Alexander MacDougall.
29/12/97	100 0 0	Barrytown ..	..	..	Barrytown Flat Co.	James Charles Duncan.
23/2/98	100 0 0	Stillwater ..	X.	Arnold ..	Record Find Co. ..	Alfred Yeadon.
17/2/92	16 1 0	..	IV.	Hohonu ..	..	Low Hoyd and party.
28/6/94	10 0 0	..	..	Waimea ..	..	John Byrne.
16/3/96	7 2 7	..	V.	Waiwhero ..	..	Davies and Egden.
23/4/96	20 2 0	..	IV.	Waimea ..	..	John Walsh.
9/7/96	15 0 25	..	..	..	..	E. A. Wickes.
12/11/96	7 3 6	..	I.	Hohonu ..	..	C. H. Linz.
28/1/97	20 0 0	..	V.	Cobden ..	..	Gifford and Will.
14/4/97	25 0 0	Barrytown ..	I.	Waiwhero ..	Lawson's Creek Hydraulic Sluicing Co.	Evan Henry Lewis.
26/5/97	30 0 0	Paparoa Range	V.	..	Kahnui Extended ..	Cornelius R. Skelly.
<i>Kumara.</i>						
4/3/87	30 0 0	..	XII.	Waimea ..	Enterprise ..	James Conaghan and party.
17/2/93	9 0 0	..	IX.	Hohonu ..	..	Elizabeth Burr and party.
18/8/93	10 0 0	..	..	..	..	The Greenstone Sluicing Co.
15/12/93	10 0 0	..	XII.	Waimea ..	Deep Level Claim..	A. J. Williamson and party.
8/5/95	8 0 0	..	..	..	..	Jane Bowden and party.
28/10/96	22 3 4	..	..	..	..	Jeremiah O'Sullivan.
14/6/97	32 1 2	..	..	..	Larrikin's ..	Thomas Moynihan.
14/4/97	16 0 0	..	..	..	Shamrock Lead ..	John Cullen and party.
28/7/97	30 0 0	Greenstone ..	..	Hohonu ..	Maori Point ..	William O'Grady and party.
1/7/83	10 0 0	..	XII.	Waimea ..	Long Tunnel ..	The Kumara Long Tunnel Gold-mining Co.
1/1/83	50 0 0	..	..	..	..	Ditto.
1/7/86	30 0 0	..	IX.	Hohonu ..	..	The Greenstone Sluicing Co.

**ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.**

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Stafford.</i>						
23/5/90	A. R. P. 8 0 0	..	XV.	Waimea ..	Callaghan's ..	J. Doyle and party.
1/2/97	30 0 0	..	V.	Otira ..	Taipo Sluicing Co. ..	H. P. Hill.
1/2/97	27 1 3	..	II.	Waimea ..	Lamplough Cement Gold Co.	James D. Gillies.
2/9/97	7 1 39	..	XV.	" ..	Goldsborough ..	J. McWhirter and party.
1/9/97	17 0 0	..	V.	Otira ..	Taipo ..	H. P. Hill.
1/12/85	28 0 0	..	XIV.	Waimea ..	Wheel of Fortune ..	G. F. Batchelor.
28/8/89	4 0 0	..	" ..	" ..	Stafford ..	Benjamin Lyons.
14/5/97	100 0 0	..	VIII.	Turiwhate ..	Taipo ..	Michael McInerney.
14/5/97	100 0 0	..	" ..	" ..	" ..	T. Stafford and another.
<i>Ahaura.</i>						
10/9/92	45 0 0	..	VIII.	Mawheranui	New Bendigo Gold-mining Co. (Ltd.)	Nelson Creek Gold-mining Co.
24/4/93	5 1 5	..	"	"	Larkin and Party ..	Richard Larkin.
24/4/93	11 1 0	..	VII.	"	Donnellan and Sons	Patrick, John, Peter, and William Donnellan.
25/9/93	19 1 36	..	VIII.	"	Nelson Creek ..	Clement Parfitt, Michael Ward, Henry Brunetti, Patrick Gilligan, John Collins, and Edward Comerford.
30/3/94	49 2 23	..	I.	Kopara ..	Bell Hill ..	Bell Hill Gold-mining Co. (Ltd.).
18/5/96	48 2 34	..	X.	Mawheranui	No Town Gold-mining Co.	Clement Parfitt.
22/6/96	50 0 0	..	V.	Kopara ..	Bell Hill Surprise Gold-mining Co.	Henry Burger, James Malloy, David McConnor, James McConnor, Richard Clough, James Holmes.
27/7/96	42 3 30	..	II.	Ahaura ..	Perseverance ..	George Erickson and two others.
26/4/97	49 3 19	..	III.	Mawheranui	Montgomerie Terrace	Thomas Jones.
11/11/95	30 0 0	..	"	"	Republic Hydraulic Sluicing Co.	Thomas Baxter, James Baxter, Thomas Jones, William Baxter, Alfred Ford, John Walsh, Henry Bignell, John Fitzgerald, and six others.
11/11/95	28 3 3	..	VIII.	"	Nelson Creek ..	Nelson Creek Gold-mining Co. (Ltd.).
27/7/96	20 0 0	..	II.	Ahaura ..	Young Napoleon Gold-mining Co.	Lemon W. Garrod and eleven others.
28/9/96	10 0 3	..	VIII.	Mawheranui	Larkins and Party	Richard Larkins and five others.
26/4/97	30 0 0	..	"	"	German Gully ..	David Flannery.
24/1/98	5 3 28	..	I.	Ahaura ..	The Arthur Lease ..	Arthur Brooks and Arthur Donn.

**MARLBOROUGH.**

*Mahakipawa District.*

*King Solomon Mine.*—The shaft, which is 120 ft. in depth, is well lined, and fitted with an efficient ladder. Power is obtained from a 30 ft. overshot water-wheel. The level at the bottom of the winding-shaft is on the run of washdirt towards the south-east some 300 ft. Small parties of miners continue working on the upper parts of the stream, and generally earn fair wages.

*Wakamarina Gorge Claim.*—Operations are now being actively carried on from the upper end of the gorge. The stuff is filled into trucks and taken on the incline tramway to the top of the dam, where it is emptied into sluice-boxes. Two sets of pumps, 3 ft. to 5 ft. stroke, raise the water to the surface. There are fourteen men employed, and considerable improvements have recently been made. The works are now in such forward progress that it will be possible to obtain the washdirt from the main bottom for a considerable portion of the full length of the gorge. In taking up the gravel a bar of rock was found lying across the old channel. This was cut through to a depth of about 10 ft. The length of the basin immediately above the bar is about 100 ft., and, saving accident by floods, this part will soon be worked out.

On the north of the Wairau River gold is occasionally worked in all the tributaries from Onamulutu up to and for some distance past Top Valley Stream. The returns are, on the whole, of a very moderate value.

Individual miners throughout the district appear in most instances to be doing very well, and several nice parcels of gold won by these men during the past few months, have been shown. Hydraulic sluicing on the scale in vogue in the southern districts is not practised here, though the country bears favourable indication that this form of mining would, if carried out in a systematic manner, be productive of profitable results. A very primitive form of mining is much practised during the summer months in the beds of the rivers and creeks, and is known as "blind stabbing." The miner, with a rod, on the end of which is placed some adhesive material, stirs up the auriferous wash, and, the water having cleared, secures the specs of gold on the adhesive substance, usually tallow, on the rod. By this extremely primitive method miners sometimes obtain gold that gives small wages on the Wakamarina, Quartz, Arm Chair, and Tipperary Creeks. A number of dredging claims have been applied for recently, and though only one—the Wakamarina Dredging Com-

pany's—has actually been at work, the returns from which have not been published, it is anticipated that the dredging industry will, in the near future, be largely in evidence throughout the auriferous river- and creek-beds in this district.

#### NELSON.

##### *Takaka District.*

Only a few men have been employed in this district during the past year. At the Bubu and Anatoki districts several parties are at work, with varying success, the scarcity of water being a drawback.

##### *Collingwood District.*

*Rocky River Sluicing Company* (Area, 100 acres).—Arrangements are being made for the effective working of this company's property. Water for sluicing is now obtained from Mackenzie Creek, but a race is being constructed from Rocky River. There is a large area of gold-bearing cement underlaid by limestone on the property.

*Johnston's United Mine* has been under protection, and in February last the prevailing bush-fires destroyed the battery and plant.

*Parapara Hydraulic Sluicing Company*.—Hydraulic-sluicing and elevating works have been carried on with varied success. The yield of gold up to December last was 198 oz., and no doubt this would have been largely augmented had they not been hampered for want of water during the greater part of the summer. The returns up to the end of February were 87 oz. of gold, showing a decided improvement compared with a similar period during last year. Mr. Peters, the former manager of the Roxburgh Amalgamated Claim, in Otago, took over the management in the beginning of 1898, and since that time matters have assumed a better aspect. Both the elevating and sluicing plants are in improved working-order, and there is every evidence of a continuance of satisfactory yields. The want of a sufficient water-supply throughout the year is a material drawback to this company. The present manager estimates that large areas of auriferous drift exist on the properties which will prove payable, but in order to secure interest on the capital employed greater quantities must be dealt with, and in order to effect this the present water-supply must be increased by improved water-races and by the conservation of the winter's rainfall. The manager has instructions to move the elevating plant from its present position to a block of land known as the "Maori Reserve," nearer the Parapara River, and having an easy way of getting rid of the tailings. The only reason for making this change is a difficulty in the manner of discharging the tailings from the elevator where it is now placed.

*Collingwood Goldfields Company*.—The following comprehensive report is taken from the *Golden Bay Argus*:—

"This company, whose headquarters are in London, holds, as we have before indicated, over 300 acres of the rich alluvial areas at the Quartz Ranges, about twenty miles from Collingwood. When some two years ago the possibilities of this locality as a legitimate mining speculation were first brought under the notice of foreign capitalists the cost and difficulties of providing the necessary water-supply for its proper development was considered a serious obstacle to the ultimate success of the scheme, and the company commenced its operations by making expensive and elaborate surveys with a view to ascertaining with some degree of scientific correctness the probable cost of connecting the alluvial deposits with an adequate supply of water, the cost being variously estimated at from £20,000 to £50,000. The result of these surveys, which were carried out under the supervision of Mr. Holdsworth, C.E., by whom a survey-line was traversed from the ranges to the Boulder Lake, over four miles distant, and levels taken, proved the feasibility of bringing a large water-supply from Boulder Lake and the Boulder River, but the expense was still considered somewhat formidable. It was then estimated that a large proportion of this race would require fluming, the quantity of timber necessary for which was put down at no less than 750,000 ft., while, owing to the rough and broken nature of the line traversed by the race (which is all through heavy bush country), the cost of cutting the race, bridging of creeks and gorges, was thought to be almost prohibitive. It was intended that the timber should be obtained from the local sawmills, and transported some miles to the race, at considerable cost, not the least of which would be the necessity for bridging the Aorere River at Salisbury's crossing. Thus it was that the development of these rich alluvial areas was considered almost beyond the region of reasonable practicability. The next step in the company's operations was the engagement as manager of Mr. F. G. Mace, a gentleman of extensive experience, both in this colony and Tasmania, in this particular class of hydraulic sluicing, and who has recently obtained his certificate as a member of the New Zealand Institute of Mining Engineers. After a careful and minute inspection of the locality, the peculiar natural advantages of the surroundings seemed to suggest to Mr. Mace an easier and less expensive method of obtaining the much needed water-supply, and accordingly an alternative scheme for the attainment of this object was laid before his superiors. In the upper reaches of the Aorere Valley the immense tracts of valuable virgin timber lands attracted the attention of the new manager, and a hasty survey of the neighbourhood confirmed the feasibility of the alternative scheme, by which this timber could be utilised for the construction of the water-race in such a manner that the obstacles which had before presented themselves could be reduced to an almost vanishing point. Acting upon these suggestions, the superior management secured large timber rights in the valley, purchased a complete sawmilling plant of their own, and entered heartily upon the carrying-out of the projected scheme, with the result that at the present moment quite an extensive industry has been established in connection with the company's operations. The sawmilling plant, which consisted of all the requisite adjuncts, was deposited at the Seventeen-mile Creek some months ago, and has been running with wonderful regularity and smoothness ever since, and is turning out timber at the rate of about 5,000 ft. per day, some 300,000 ft. now being stacked in the vicinity of the mill ready for transport to the race. Adjacent to the mill a suitable



site was found in the Aorere River for the erection of a small jetty, from which the timber is conveyed across the river in a punt, and from thence will be taken to the ranges by means of a tram-line, which is being constructed for a distance of nearly four miles, and has now almost neared completion. The site of the sawmill has been chosen with due regard to the saving of manual labour, the greatest disadvantage being its distance from a seaport and the consequent extra expense of food-supplies for the bullocks and horses employed about the mill, of which there are twelve of the former and three of the latter. From the mill the timber is taken by means of a tram-line to the river-edge, about 20 chains, where it is deposited into a large punt (constructed on the spot) capable of carrying over 10,000 ft. per day, and from thence is conveyed to the opposite bank, where also a good landing-place has been provided by Nature. From here commences the tram-line, which is constructed in the ordinary manner with sleepers, wooden rails, and well ballasted. For the first mile or so the tram-line runs through bush country, from whence it opens out into pakihi lands, over which it continues its course right to the Quartz Ranges, attaining an altitude of over 1,200 ft. in about four miles, in which the steepest grade obtained (and that for only a short distance) is 1 in 7, the average grade being 1 in 16. It is intended that the timber shall be taken over this tram-line to the race-line by means of horses and trucks, and the trucks will be run down again by brakes specially constructed for speed and safety. It is estimated that by the securing of the valuable timber lands, purchase of milling-plant, and construction of this tram-line, the cost of the necessary timber will be reduced to about one-sixth of the expected cost under the original scheme proposed, a circumstance which has removed one of the greatest obstacles in the way of ultimate success. Almost simultaneously with the carrying-out of the above preliminary works, Mr. Mace has also pushed forward the benching of the water-race, of which up to the present nearly one mile has been completed. The construction of the race will prove a work of some magnitude, traversing as it does some of the most broken and mountainous country in the district, and the continuity of the race is broken at frequent intervals by deep ravines and gorgy creeks, which will all require bridging, timber for which is being squared on the ground. The engineering difficulties are, however, not by any means insurmountable, and under efficient management the work is progressing rapidly. The dimensions of the race, which will be over four miles long, are: 6 ft. wide at top, 4 ft. 6 in. at bottom, and 3 ft. 8 in. deep; while the flume is 4 ft. wide and 3 ft. 3 in. deep. The race will have a fall of 3 in. to every 100 ft., and the flume 6 in. to every 100 ft. The carrying-capacity of this structure will be fifty Government heads of water—i.e., the volume of water which can be discharged therefrom equals 19,500 gallons per minute—which magnificent supply, it is anticipated, will be obtainable in the Boulder River and Boulder Lake; and for the further conservation of the supply it is also proposed to construct a dam at the mouth of the lake—an already valuable and extensive sheet of water, of an average depth of 16 ft., and 105 acres in extent—by which the volume of the precious fluid will be almost doubled. When consummated, this water-supply scheme could be made to command thousands of acres of rich alluvial country for many miles around, which only require such a water scheme to develop them into payable ventures. In addition to the saving effected in the cost of timber as already enumerated, it has been discovered in the benching of the race that the nature of the country traversed by the race is such that in the construction much of the fluming can be dispensed with, and open race substituted: thus a considerably less quantity of timber will be required than formerly estimated. The collective advantages thus obtained have reduced the probable cost of carrying the whole project to an actual working-point to quite one-half of the lowest estimate originally ventured upon by the most sanguine, and the management now consider the work will be carried out at much less than their own estimate. The hydraulic plant required by the company in their sluicing operations, which will be considerable, is to be obtained from Dunedin, and the contract for supply is already in hand, the plans and specifications having been prepared by Mr. Mace on the ground, so that every portion of the works will go forward together. Mr. Mace anticipates that, if no great unforeseen obstacles arise, the race will be completed and the hydraulic plant erected and in full working-order early in next year; but, of course, a great deal depends on the weather in such an inhospitable locality. Although the Quartz Ranges, practically the whole of which the company holds, has long been considered one of the most promising alluvial fields in the colony, and this opinion has always been amply verified by the large yields of heavy gold which have been obtained there for over a quarter of a century by the most primitive methods of mining, the management wisely took the precaution to systematically prospect their property for themselves, which work Mr. Mace has recently had done by practical miners, who were employed in sluicing and prospecting in various portions of the property. The results of these operations are reported to have been very satisfactory, and appear to have placed the ultimate prosperity of the venture beyond the problematical stage, especially in the face of the very much reduced cost of its development. At present the company employs about sixty workmen, distributed over its several centres of operation. Mr. Mace is in full charge, and has proved himself a really practical, energetic, and capable officer."

*Motueka District.*

*Wangapeka, Sherry, and Baton.*—Some thirty men are employed in these subdistricts, and are earning fair wages. The special claims applied for in the Mount Arthur district have not been taken up.

WEST COAST.

*Westport District.*

*Addison's Flat* (Halligan and party).—Six men are employed here opening up a new face near the Charleston Road, from which a shaft is sunk connecting with the tail-race. The plant in connection with the tramway water-balance is in effective condition.

*Shamrock Claim.*—Considerable improvements in the appliances for working this claim have been effected during the past year, and an additional six heads of water have been obtained. Eight men are employed.

*General Exploration Company.*—This company has been engaged in developing the Fairdown Terrace, to the northward of the Buller River, and the Bendigo Terrace, to the southward. The high-level cement areas at Four-mile are also to receive attention, while extensive prospecting operations have been carried on throughout the company's properties. It is intended to further enlarge the water-supply for the Fairdown Claim, and surveys have also been completed for an additional water-supply for Bendigo and Addison's Flat. To date the company has constructed 25,014 ft. of water-races and 10,857 ft. of tunnelling. The average number of men employed has been 218.

*Addison's Flat Golden Sand Company.*—This Auckland company employs twelve men, and has a ten-head battery, and an incline tramway on which the cement is brought to the mill, the motive-power being supplied by a 12 ft. water-wheel.

*Venture Claim* has a twelve-stamp battery, driven by a 30 ft. diameter water-wheel, which is employed in crushing the cement, which is brought to the mill by means of a horse-tramway. Eight men are employed.

*Milligan and Party's Claim* (Area, 50 acres).—Eleven men are employed. A ten-head stamper battery, driven by a 6 ft. Pelton wheel, is in use.

#### Charleston.

*Dublin City Claim* (Area, 9 acres).—An eight-head battery, driven by a water-wheel 36 ft. in diameter, is being worked by the four shareholders.

*Morning Star Claim.*—A four-stamp battery, driven by a water-wheel 35 ft. in diameter, crushing about sixteen loads of cement a day, is at work. Four men are employed.

*Dee Creek Gold-sluicing Company* (Area, 99 acres).—A water-race has been constructed three miles in length, and a dam has been erected. A tunnel is being driven to enable the tailings to be discharged into Dee Creek. It is anticipated that sluicing will be commenced in June. Thirty men are employed.

At White's Point a scheme for the diversion of the Buller River is contemplated, and two special claims have been applied for, which will be drained should the diversion be successfully carried out.

At Maruia Mr. George Walker has two special claims and a licensed holding, comprising some 70 acres of alluvial ground, and water is now being brought in for use in ground-sluicing.

#### Inangahua District.

*A 1 Sluicing Claim.*—A subsidised prospecting tunnel in this claim has been put in a further distance of 728 ft., and is now in 1,317 ft. It is anticipated that the alluvial flat near Boatman's will be opened up on the completion of this drive.

#### Grey District.

*Barrytown No. 1 Claim* (Area, 92 acres).—Twenty men have been employed in development operations during the year. The water-races are in a forward state, and it is anticipated that elevating appliances will be completed at an early date.

*Barrytown No. 2 Claim.*—The construction of a water-race one mile in length has been energetically carried on. The wash in this claim is to be worked on the elevating principle, and, as the area is 100 acres, there is a large quantity of material to be operated on.

*Waiwera Special Claim.*—Fifty men are employed on this property in the construction of water-races.

The beaches between Greymouth and Barrytown furnish payable employment for a number of men.

#### Ahaura District.

There are a large number of individual miners working in this district, at Callaghan's Creek, Nelson's Creek, and their tributaries. In German Gully development-works are being carried out by a Christchurch syndicate preparatory to starting hydraulic sluicing.

*Orwell Creek and Pennyweight Flat.*—A considerable number of individual miners are engaged here, and if the water-supply were more regular their returns would be greater.

*Grey Valley.*—The work of constructing water-races at Sulky Gully is being pushed on, and 185 chains between the rocky tunnel and head-race has been cut.

The Montgomery Terrace Company intend to bring in water from Blackball Creek, a distance of some four miles.

*Half-ounce, Duffer's, Granville, and Noble's Creeks.*—Only a few miners are employed on these creeks, in consequence of want of water.

*Bell Hill.*—A few parties of miners are still working at Bell Hill, and water has been brought in by a Christchurch company to work their licensed holding.

*Taipo.*—The Taipo Sluicing Company have been carrying on operations with a fair amount of success.

*No Town and Red Jack's.*—A number of Chinese are working the beds of these creeks, and sluicing operations are being extensively carried on.

*Roaring Meg Sluicing Claim, Upper Blackball* (Area, 50 acres).—Mr. G. Perotti, of Greymouth, gives the following account of the works:—

"Last year the company bore the name of Roaring Meg Water-race and Gold-mining Company, in co-operation. In September, 1897, the company was reorganized, under the appellation of the Roaring Meg Sluicing and Hydraulic-power Company (Limited). The first company, after spending £8,000 or £9,000 in development of the property, were unable to produce the further capital required to bring the claim to an effective working-point, and in order to succeed the old shareholders had to

sell part of their interest, and the new company was floated. I am a director of the new company, and am probably in the best position to detail the work done in the past twelve months. In the report for 1896-97 I stated it was the company's intention to erect hydraulic cranes for lifting the numerous large boulders of the wash, and to instal the electric light for working twenty-four hours per day. The new company is pushing on the work of erecting machinery with as much energy as circumstances allow, but they are retarded by the difficulty of carrying heavy machinery along an inferior pack-track. This difficulty is now obviated by the construction of a tramway-line, done by private enterprise, and the machinery can now be carried to the claim without difficulty or risk. A pipe-line was cleared for utilising 600 ft. of hydraulic pressure. A 5-ton crane has been purchased in the colony, and a 5-ton derrick, with a jib 45 ft. long, has been imported from America. The American derrick is such as is used in America for the same purposes, and is described as very effective in the quick disposal of heavy stones. The company has employed two men constantly through the year sluicing, although such work under the existing conditions did not pay. During the year the company spent a large amount in procuring machinery, and next year the operations should produce a much more favourable state of gold-production."

*Healey's Gully.*—The claims at Healey's Gully, though proving remunerative, are being worked under disadvantages, in consequence of the insufficient supply of water, the whole supply of the field being in the hands of the Great Republic Company, and is used by that company during the day; the other miners, whose intention it is to erect a reservoir in Roaring Meg Creek, having at present to use the water during the night.

#### *Kumara, Waimea, and Stafford.*

These districts are fairly prosperous, the past year being favourable for sluicing operations, and in consequence satisfactory returns were in most cases obtained. To the mouth of the Teremakau, and on the Greenstone, the only change worth recording is the improvement in the races and dams of the Erin-go-Bragh Company. Owing to the improvements thus made, this company now supplies a large number of claims below the Greenstone Road. P. Grady and party's special claim has been taken up by a Christchurch syndicate, and they are now busy with race and dam construction, preparatory to a more extensive way of working. First-class returns were obtained from this claim before it passed into the hands of the present owners. It will be some time before the syndicate will be in a position to prove the value of this property. Considerable improvements have been made in the methods of sluicing the ground worked during the year, but, notwithstanding this, several claims have been abandoned on account of non-payable results. Further prospecting has been done in the deep levels, and, although there are several claims now at work and paying small wages, no rich runs have been discovered.

The deviation of the Waimea Water-race at Kawaka has considerably improved the water-supply for the Waimea and Stafford districts, and the Wainihinihi Race, when completed, will still further augment it; in fact, after the race is completed the supply will be ample and constant. A survey of the race has been made, and it is anticipated the work of construction will be proceeded with forthwith. No stoppage in the supply occurred during the year. The branch race to Callaghan's has been made use of by a few parties during the year, and, as there is a considerable area of unworked ground in the locality, a more extensive use of the race-water may be looked for in the future.

The Middle Branch dams and branch race, for the supply of water to the claims intending to sluice into the Waimea Main Tail-race, have had very little done to them during the year.

The Waimea Main Tail-race has been completed, with the exception of timbering the jump-up and one or two small matters, and could, with a very small expenditure, be made use of at once. The delay in making use of this tail-race has been caused by certain financial difficulties, which it is to be hoped soon will be settled. The starting of sluicing in this main tail-race would give a great impetus to mining in the district.

The Kelly's Terrace Drainage Tunnel has been driven about 2,602 ft., but no gold has been met with. A further distance has yet to be driven before known auriferous ground will be reached.

The general supply of water for the year was ample; the dams were empty for only two days during the whole year. The increased capacity on the large dam at the Loop-line Road has been a great boon to Kumara, as, had it not been for this, water would have been short on the field on several occasions. The completion of the Wainihinihi Race will to a large extent render the supply for Kumara independent of long periods of dry weather, and make it regular and constant.

The No. 5 Channel is drawing near completion in a satisfactory manner, and before another year expires several claims should be opened out, and sluicing into it. The starting of sluicing into this channel should tend to a revival of mining in Kumara, and a much greater demand for water.

The principal claims supplied by the Government race are those of Lee and party, ten men; Shrive's, five men; Carlson, four men; Schroeder, four men; Bowden, four men; Marshall, four men; Pascoe, six men; Dillon four men; Williams, three men; Light, five men; Neame, three men; O'Connell, five men; Rochford, four men; Harris, five men; Neville, four men; Conaghan five men; Cullen, six men. The total quantity of gold obtained by the parties using water from the Government water-race during the year, was 4,720 oz., valued at £18,408.

The Wheel of Fortune Special Claim is reported to be yielding fair returns, and the owner is endeavouring to secure additional capital for its more extensive development.

#### *Arahura District.*

Prospecting operations are being carried on by Dwyer and party.

*Humphrey's Hydraulic Sluicing Company (Limited).*—Sluicing operations were carried on with two nozzles, for which twenty sluice-heads were used. Surveys have been completed for the

new water-race, through which a permanent supply from the Arahura River will be brought to the ground. The work of construction entails nearly eight miles of new race above the present reservoir, and a mile and a half between the Long Tunnel and Black's Tunnel. The old race is being renewed, and all structures replaced by works of a more permanent character. The Long Tunnel has been put in a good state of repair, thus making accessible the gravels lying on the McDonald's Gully side of the property. At least two faces are to be opened in Humphrey's Gully, and the water-supply thus distributed will make available for working all gravels lying between the north side of Humphrey's and the south side of McDonald's Gully.

#### *Arahura Flat.*

*Boys' Claim.*—Work has not been energetically carried on by this party. Dwyer and party, who are driving a tunnel for which a Government subsidy has been paid, have completed 1,627 ft. The total distance to be driven to reach German Gully is 2,373 ft., and the tunnel when completed will be 4,000 ft. in length.

#### *Rimu, Back Creek, and Seddon's Terrace.*

The claims in this district continue to afford profitable employment to a considerable number of miners. There is not a sufficient supply of water available for hydraulic sluicing to any very great extent. A number of men, however, are engaged in driving out the wash and sluicing it whenever a supply of water can be obtained. The scheme for bringing in water from Lake Kanieri has not yet been perfected, and, so far, survey work only has been carried on. Until a more extensive supply of water is brought to this field no increase in the yield of gold is probable.

Craig's Freehold and the other ground further down the river still yield satisfactory returns. A party of seven tributers are engaged on this ground.

*Kanieri Forks.*—The claims in this locality continue to be profitably worked, the Kanieri Lake Water-race furnishing a supply of water for hydraulic and ground-sluicing.

#### *Ross District.*

*Mont d'Or Claim.*—Hydraulic-sluicing operations still continue to be profitably carried on. Twenty-two men are employed.

*Ross United Gold-mining Company.*—Twelve tributers are employed, with fair results, in the claim at Ross. The Prince of Wales Claim at Donoghue's Creek is also owned by this company.

Several other claims are also worked for fair returns in different parts of the district.

*Donnelly's Creek.*—Several parties have been working here throughout the year.

*Duffer's Creek.*—A tunnel, on which subsidy is being paid by the Mines Department, is being driven by Messrs. Marchesi and Scott, and has at present attained a length of 370 ft.

#### *Okarito and Jackson's Bay.*

The Waiho Hydraulic-sluicing Company is engaged in extensive operations on the terraces between the Callary and Totara Rivers, and a large amount of piping for the race is being carted to the ground. The difficulties of transport have somewhat retarded the commencement of operations, but it is anticipated that sluicing will be started in some four or five months. A considerable number of men have found employment in the preparatory works.

Most of the individual miners in this locality intend during the winter to work the beaches of the Upper Callary. The sea-beaches to the southward have furnished profitable employment to a number of men during the year.

Prospecting has been carried on with what is reported as satisfactory results in a special claim at Sardine Terrace, near the Ship and Bullock Creek, and a race to carry ten heads of water is to be brought in.

*Lake Ianthe.*—The works here are furnishing employment to some six men, who are apparently doing very well.

#### DREDGING.

##### *Marlborough and West Coast.*

*Wakamarina.*—Dr. McKenzie's dredge, which has been at work for a considerable portion of the year on the river, about a mile above Canvastown, yielded payable returns. The dredge was lately sold to a company, and additional ground was taken up. It is probable that a larger and stronger dredge will be built, the present one being of a description unsuitable for dealing with the heavy material of the wash in this river.

*Mahakipawa.*—A small dredge is to be put on to test the gravels in the flats leading to Pelorus Sound.

*Buller River.*—The Exchange (formerly Cocksparrow) dredge is working near Three Channel Flat. The company that first owned the dredge did not meet with success, and the dredge was disposed of to the wages-men, who are now doing well.

*Buller Dredge.*—This dredge has been working in the river at Fern Flat with satisfactory results. At present, operations are carried on at the junction of Husband's Creek with the Buller River, where there is a wide face of gravel to be dealt with. The owners are building another dredge in the vicinity of the present one. The new dredge, however, is meant to deal with double the quantity of gravel that can be done by the Buller dredge. Mr. R. Tennent, Inspector of Mines, who made a special examination of the Buller Company's new dredge, obtained full information, of which the following are some of the particulars:—

"The pontoons are 90 ft. long, having a square deck-floor of 75 ft. in length by 25 ft. in width, including 4 ft. 6 in. for well-hole in centre. The front parts are strongly built bulkhead watertight compartments, connected with heavy overhung beams to guard against floating timber in river-flood. The timber is specially selected for their construction, being black-birch for frame-

work and totara for lining. Dimensions of timber: Studs, 6 ft. long by 6 in. by  $4\frac{1}{2}$  in.; cross-stays, 6 in. by 4 in.; side-lining, 9 ft. by  $2\frac{1}{2}$  in.; bottom-lining, 12 in. by 3 in. The bottom-lining plank around the side is 12 in. by 3 in. The estimated quantity of timber in the construction of these portions is 40,000 ft. The bucket-ladder, built of heavy brattice-work, is 49 ft. long, and weighs about 8 tons. It carries twenty-seven buckets, 7 cwt. each, with a capacity of  $4\frac{1}{2}$  cubic feet, discharging from eight to ten buckets per minute, and capable of lifting from a depth of 35 ft. The ladder is hung from the tumbler-frame, which is 12 ft. above deck, and suspended at the bottom by means of wire rope with block and tackle from a beam supported by a strong frame of angle-iron, and can be raised and lowered as required by the steam-winch. The engines are of the compound type, supplied with steam at 120 lb. pressure, and worked to 40-horse power. Engines and boiler are supplied by Messrs. Marshall and Co., engineers, Birmingham. The material discharged from the buckets is landed on to a delivery-plate, down which it shoots into a steel-plate revolving-screen, 17 ft. long, with a fall of 20 in., and filled with  $\frac{1}{2}$  in. perforated holes. A 10 in. centrifugal pump supplies water to thoroughly wash the drift. The finer wash and gold falling through the perforated screen is collected into a distributing-box, from thence over a surface of gold-saving tables 160 square feet laid with plush. The waste is collected into a flume and run over the stern. The rough *débris* from the screen is lifted by a tailings-elevator carrying twenty-six buckets, and discharged over the stern end. The whole of the ironwork is of the most modern and improved construction, and was obtained from various engineering shops in Dunedin, the total weight being about 80 tons. Bolts, 16 in., and spike-nails, are imported; those over this length are made in the colony. Calculations for working-expenses are from £30 to £35 per week, £8 being the estimated cost for fuel (wood to be used). Seven men employed on board for three shifts."

This dredge, when completed, will cost about £4,500.

*Murchison*.—The Matakita Gold-dredging Company have recently built a new dredge for working the gravels in the Matakita River, on which they have secured a claim of 37 acres 3 roods 37 perches near Murchison. A commencement has been made, and operations give promise of success.

*Mahinapua Creek*.—Philips's Dredging Company launched a dredge in November last, and work of a preparatory and prospecting character has been carried on in the swamp flat about a mile from Lake Mahinapua.

Dredging has not, so far, obtained the hold on the West Coast in such proportions as have attended this method of working in the Otago District. There are, however, evidences that many of the flats containing auriferous gravel will yet be dealt with in this way. The success which has attended some of the pioneer dredges in Otago in conducting operations where no large stream or river is available has demonstrated the possibility of working large quantities of gravel with a very limited water-supply.

There is a general disinclination on the part of dredge-owners to furnish returns of gold, the result of their operations, but the following particulars have been published by the Buller Dredging Company: May, 1897, 76 oz. 10 dwt.; June, 67 oz. 10 dwt.; July, 63 oz. 15 dwt.; August, 97 oz.; September, 59 oz. 10 dwt.; and show the profitable nature of their dredging work.

#### OTAGO AND SOUTHLAND.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Naseby.</i>						
1/1/84	A. 30 0 0	St. Bathans ..	II.	St. Bathans	..	St. Bathans Water-race Co. (Ltd.).
1/1/84	B. 35 0 2	" ..	VII.	"	..	Scandinavian Water-race Co. (Reg.).
31/8/92	10 0 24	" ..	I.	"	..	Thomas Hughes and J. Morgan.
1/1/93	5 0 0	Naseby ..	II.	Naseby ..	..	John Hore.
5/5/93	29 2 32	St. Bathans ..	VII.	St. Bathans	..	United M and E Water-race Co. (Reg.).
21/7/94	100 0 0	" ..	I.	"	..	John Ewing.
23/2/95	24 0 0	" ..	II.	"	..	United M and E Water-race Co. (Reg.).
30/11/96	39 0 30	" ..	I.	"	..	John Ewing.
15/12/96	50 0 0	Serpentine ..	XIII.	Long Valley	Laffey and Party ..	John Laffey.
15/12/96	47 3 10	" ..	"	"	"	Patrick Laffey.
25/3/97	63 0 0	Enterprise Gully, Naseby	XVIII.	Naseby ..	(Alluvial and dredging)	Thomas Jackson.
10/9/97	43 0 0	St. Bathans ..	III.	St. Bathans	..	William McCormachie and J. Kennedy, jun.
10/9/97	95 2 0	" ..	I.	"	..	John Ewing.
23/11/97	55 3 0	Naseby ..	III.	Naseby ..	(Alluvial and dredging)	James Sim.
21/1/98	75 3 34	St. Bathans ..	I. IV.	St. Bathans } Blackstone	..	John Ewing.
6/8/88	15 0 0	Hamilton South	I.	Rock and Pillar	..	John Hambley and others.
9/9/90	8 0 0	Naseby ..	"	Naseby ..	..	Enterprise Water-race Co. (Reg.).
11/7/90	16 0 20	St. Bathans ..	"	St. Bathans	..	Bank of New South Wales.
5/5/93	7 2 37	" ..	"	"	I.X.L. ..	Harry Excell and another.
1/1/92	10 0 0	" ..	II.	"	..	St. Bathans Water-race Co. (Reg.).
20/9/93	5 2 13	" ..	III.	"	..	M. Hunt, H. Mee, and Bank of New South Wales.
20/2/95	10 0 0	Mount Highlay, Hyde	Pt. VIII.	Rock and Pillar	Deep Sinking Co. ..	W. Mathewson and others.
6/2/95	16 2 17	St. Bathans ..	VII.	St. Bathans	St. Bathans Water-race Co.	St. Bathans Water-race Co. (Ltd.).
12/2/95	18 2 26	Naseby ..	Pt. I.	Mount Buster	Mount Buster Mining Co.	Mount Buster Mining Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Naseby—continued.</i>						
24/9/95	£ 3 0 0	Naseby ..	I.	Naseby ..	Extended Water-race and Sluicing Co.	John Hore.
6/3/96	6 0 0	St. Bathans ..	IV.	Blackstone ..	..	Robert Jones.
13/10/96	19 2 28	..	II.	St. Bathans ..	..	John Ewing.
19/8/96	11 0 16	Hyde ..	XVI.	Maniototo ..	Hyde and Find Co.	Hyde and Find Gold Co. (Ltd.).
29/9/96	4 2 19	Naseby ..	I.	Town of Naseby	Inder Brothers Hydraulic Co.	R. S. F. Inder and F. W. Inder.
29/9/96	4 0 0	..	..	Naseby ..	..	Simeon Hewitt.
29/9/96	8 0 0	..	II.	..	Enterprise Water-race Co.	Enterprise Water-race Co. (Ltd.).
27/10/96	29 2 21	Taieri River, Hyde	III.	Rock and Pillar	Capburn Mining Co.	Taieri Gold-sluicing Co. (Ltd.).
27/10/96	29 2 12	Ditto ..	..	..	Capburn Sluicing Co.	..
6/11/96	17 3 0	St. Bathans ..	II.	St. Bathans ..	..	Scandinavian Water-race Co. (Reg.).
25/3/97	3 3 28	Naseby ..	I., VIII.	Town of Naseby	..	Charles Hore.
25/3/97	11 2 20	..	I.	Naseby ..	..	Sarah J. McLaren, Jane Paisley, and Julia Guffie.
7/9/97	5 2 0	..	II.	..	..	John Hore.
7/9/97	21 0 0	..	XVIII., I.	..	..	Richard L. Francis.
10/9/97	4 1 18	St. Bathans ..	I.	St. Bathans ..	..	William Gay and James Fordham.
21/1/98	28 3 0	..	III.	..	..	James Hesson and others.
14/12/97	13 0 7	Naseby ..	I.	Naseby ..	..	John W. Reed.
<i>Dunedin.</i>						
14/8/96	40 0 0	Lee Stream ..	VII.	Deep Stream	..	Deep Stream Hydraulic Sluicing Co.
14/8/96	40 0 0	Sutton ..	X.	Lee Stream ..	..	..
13/1/97	40 0 0	..	XII.	Sutton ..	..	..
13/1/97	38 0 0	..	VII.	Lee Stream	..	..
13/1/97	38 0 0	..	XII.	Sutton ..	..	..
29/4/97	25 3 17	Nenthorn ..	VII.	Lee Stream	..	..
12/10/97	41 1 0	Lee Stream ..	XI., XII., VII.	Nenthorn ..	..	D. C. Simpson and H. Piper.
20/10/98	26 1 30	Nenthorn ..	VII.	Lee Stream ..	..	J. G. Sawell.
3/7/96	12 3 4	Mount Hyde ..	IV.	Mount Hyde	..	Thomas A. Hunter.
3/7/96	16 2 0	..	V.	..	..	Richard Sheppard.
7/8/96	16 2 0	..	..	..	..	Harrison and Lyders.
2/10/96	9 2 39	..	VI.	..	..	John Macdonald.
8/1/97	13 2 12	Sutton ..	X.	Sutton ..	..	Deep Stream Amalgamated Hydraulic Sluicing Co.
8/1/97	20 0 0	Mount Hyde ..	IV.	Mount Hyde	..	James Garrett
7/5/97	3 3 17	Lee Stream ..	VII.	Lee Stream ..	..	Deep Stream Hydraulic Sluicing Co.
<i>Cromwell.</i>						
15/10/97	40 0 0	..	V.	Cromwell ..	..	John Werner and party.
9/7/97	30 0 0	Fatboy's ..	X.	Cardrona ..	..	F. G. Naumundun.
<i>Clyde.</i>						
12/3/97	16 0 0	Dunstan ..	II.	Leaning Rock	Kitto and Party ..	J. Leamy and others.
<i>Alexandra.</i>						
1/3/97	17 0 0	Obelisk Creek ..	I.	Cairnhill ..	Carroll and Party ..	P. Carroll and another.
23/3/97	37 0 0	..	..	..	John Ewing ..	John Ewing.
1/7/96	50 0 0	Galloway Run ..	VI.	Tiger Hill ..	Galloway Sluicing Co.	William Hansen and others.
1/10/96	39 0 0	Poverty Beach ..	I.	Fraser ..	Golden Beach Co. (sluicing and dredging)	The Golden Beach Hydraulic E. and Dredging Co. (Ltd.).
18/9/97	65 0 0	..	..	..	Ditto ..	Ditto.
18/9/97	33 0 0	Dunstan Flat ..	VII.	Leaning Rock	Golden Point Co. ..	The Golden Point Dredging Co. (Ltd.).
22/2/97	63 0 0	Obelisk Creek ..	I.	Cairnhill ..	Last Chance Co. ..	J. Hesson and others.
18/9/97	100 0 0	Galloway Run ..	VI.	Tiger Hill ..	..	Otago Syndicate (Ltd.).
18/9/97	20 0 0	George Creek ..	III.	Cairnhill ..	..	R. J. Pitchers and others.
5/2/94	12 0 0	Near Alexander ..	VI.	..	Tucker Hill ..	J. Rivers and another.
6/6/93	6 0 0	Obelisk Creek ..	I.	..	Wilkinson's ..	G. Wilkinson.
<i>Black's.</i>						
4/11/96	30 0 0	Blackstone Hill	XI.	Blackstone ..	Blackstone Hill Co.	Blackstone Hill Gold-mining Co. (Ltd.).
7/8/92	82 0 0	Tinker's ..	VII.	Lauder ..	Ewing and McConnochie	J. Ewing and another.
21/7/92	30 0 0	..	X.	..	Matakanui Co. ..	Henry Duck and others.
1/7/92	25 0 0	..	VII.	..	..	..
18/3/96	22 0 0	..	..	..	..	W. Greenbank and others.
21/7/92	15 0 0	Drybread ..	X.	..	Mellor and Young ..	C. Mellor and another.
1/7/95	25 0 0	Tinker's ..	VII.	..	Mountain Race Co.	Mountain Race Gold-mining Co.
1/1/92	15 0 0	..	..	..	Sims and Morgan ..	John Sims.
3/4/95	16 0 0	..	..	..	..	J. Sims and another.
10/12/92	31 0 0	..	..	..	Sugar-pot Co. ..	S. Read and others.
20/5/96	20 0 0	..	..	..	Undaunted Co. ..	Undaunted Gold-mining and Water-race Co. (Ltd.).

## ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Roxburgh.</i>						
21/11/92	A. 88 0 0	Opposite Roxburgh	I.	Teviot	Roxburgh	Roxburgh Amalgamated Mining and Sluicing Co.
2/6/93	B. 30 0 0	Hercules Flat, Roxburgh	VII.	"	Ewing's	John Ewing.
7/11/93	P. 62 0 0	Ditto	"	"	Ewing's (late Hercules No. 1)	"
22/7/93	5 0 0	Coal Creek	II.	"	Manuel's Claim	Moses E. Manuel.
21/11/93	9 0 0	Bank of river six miles above Roxburgh	V.	"	Pleasant Valley	Pleasant Valley Gold-mining Co. (Ltd.).
21/11/93	19 0 0	Commissioner's Flat	I.	"	Haughton and Party	J. Haughton and others.
1/10/95	8 0 0	Horseshoe Bend	XII.	Benger	Fenton Brothers	John Fenton and another.
26/9/96	10 0 0	"	IX.	"	Edie and Kirkpatrick	Edie and another.
29/3/97	92 0 0	"	"	"	J. Rattray	James Rattray.
7/6/97	29 0 0	Roxburgh East	I.	Teviot	Loudon and Party	Thomas Loudon and others.
7/6/97	51 0 0	Dismal Swamp	X.	Long Valley	Stewart and Party	P. T. Stewart and others.
7/6/97	23 0 0	Horseshoe Bend	IX.	Benger	"	Herbert Park.
7/6/97	23 0 0	Upper Waikaia	II.	Whitecomb	Elliott and Party	James Elliott.
13/5/97	7 0 0	Horseshoe Bend	IX.	Benger	Rattray and Party	C. W. Rattray.
13/6/97	12 0 0	Miller's Flat	VIII., III.	"	Laffey and Party	Patrick Laffey.
16/8/97	100 0 0	Anderson's Flat	VII.	Teviot	Ewing	John Ewing.
16/7/97	69 0 0	Upper Waikaia	V.	Whitecomb	Elliott and Party	P. Reardon and others.
18/6/97	13 0 0	Horseshoe Bend	XII.	Benger	Fenton Brothers	John Fenton and another.
<i>Lawrence.</i>						
7/6/97	22 1 15	German Creek	VI.	Tuapeka	Scott and Party	George Scott and party.
19/7/97	70 2 15	"	V.	Waitahuna E.	Sailor's Gully	Sailor's Gully Gold-mining Co. (Ltd.).
23/9/97	62 0 19	Weatherstone's	X., XIV.	Table Hill	Mammoth	J. R. Gascoigne.
4/3/98	46 1 19	Munro's Gully	XVIII., XIX.	Tuapeka East	Tuapeka Sluicing Co. (Ltd.)	E. Mills and E. Browne.
17/2/98	31 1 32	Waipori	VI.	Waipori	"	Lewis Pearsall and A. Munro.
4/3/98	73 1 34	Weatherstone's	X.	Tuapeka East	Golden Rise Mining Party	W. F. Smyth and party.
17/2/98	68 3 7	Waipori	V.	Waipori	Pedlow and Party	William Pedlow.
10/9/94	66 3 0	"	XVIII.	Tuapeka East	Blue Spur and Gabriel's Gully	The Blue Spur and Gabriel's Gully Consolidated Gold Co. (Ltd.).
27/11/94	26 0 30	"	X.	Waitahuna E.	"	Charles Thomson and party.
28/1/96	84 1 0	"	XIV.	Waipori	Bakery Flat	Bakery Flat Sluicing Co. (Ltd.).
28/7/96	47 0 32	"	IV., I.	Beaumont	Beaumont Local Co-operative	The Beaumont Local Co-operative Gold-mining Co. (Ltd.).
10/8/96	99 1 0	"	XI.	Tuapeka East	Golden Key	H. H. Eaton and party.
15/2/97	34 2 0	"	V., VIII.	Waipori	Golden Block	Archibald Thomson.
15/2/97	20 2 15	"	I.	Waitahuna W.	Tuapeka Mouth Sluicing Claim	Watts Goodwin.
15/2/97	28 2 0	"	XIV.	Tuapeka East	"	James R. Gascoigne.
13/7/96	11 0 0	"	IV.	Waipori	"	John Lawson.
23/6/96	29 3 4	"	"	"	"	Lewis Pearsall.
8/12/96	28 3 5	"	XIV.	Tuapeka East	The Boom	Mary S. Knight.
27/4/97	20 3 28	Waitahuna	X.	Waitahuna E.	Grant and Party	John Grant.
27/7/97	16 2 17	"	V.	Table Hill	Ritchie and Party	Thomas T. Ritchie.
27/7/97	18 2 11	Waipori	XIV.	Tuapeka East	Sligo and Party	Alexander Sligo.
28/2/98	12 2 14	Beaumont	VII.	Beaumont	Murdock and Party	Daniel Murdock.
21/10/87	10 1 36	"	V.	Waitahuna	Ferris and Party	Joseph Ferris and party.
25/7/93	8 0 3	"	XVIII.	Tuapeka East	Fidelity Co.	James McFarlane and party.
10/9/94	18 0 27	"	XIV.	"	Local Industry	Local Industry Gold-mining Co. (Ltd.).
14/1/95	16 3 26	"	XVIII.	"	Perseverance Co.	John Kltto and party.
26/11/95	8 3 16	"	XV.	Crookston	Undaunted Gold-mining Co.	John Edie and J. Kirkpatrick.
13/4/96	19 2 17	"	V.	Table Hill	"	David McGill.
25/3/96	11 0 21	"	X.	Waitahuna E.	Quilter and Party	Thomas and Thomas Francis Quilter.
13/7/96	8 2 28	"	VI.	Waipori	Parker's Deep Lead	James Parker.
<i>Waikaia.</i>						
20/4/96	31 3 33	"	I., III.	Waikaia	Argyle Hydraulic	R. T. Stewart (trustee).
15/6/96	70 1 0	"	I.	Nokomai	Erakine's	Lion Gold-mining Co.
24/8/96	30 0 0	"	V.	Wendon	Break-'em-All	Otago Syndicate (Ltd.).
24/8/96	44 2 34	"	I.	Waikaia	Argyle Hydraulic	R. T. Stewart (trustee).
24/8/96	40 0 3	"	VII.	Nokomai	"	W. H. Hall.
14/9/96	26 2 0	"	II.	Wendon	Landslip Claim	Albert McIvor.
14/9/96	20 0 0	"	V.	Waikaia	"	R. T. Stewart and T. Taylor.
16/10/96	53 1 24	"	VI.	"	"	J. W. Stewart and H. Hamer.
3/2/98	77 1 29	"	III.	Nokomai	"	Parrawa Water-supply and Gold mining Co. (Ltd.).
16/10/96	98 1 0	"	V.	"	Golden Terrace Hydraulic Co.	R. T. Stewart (trustee).
22/3/97	38 2 4	"	IX., XIV.	Chatton	"	W. McGill.
15/4/97	27 0 24	"	V.	Wendon	Break-'em-All	Otago Syndicate (Ltd.).
20/10/97	22 1 0	"	IX.	Waikaia	Waikaia Gold-mining Co.	R. Whittingham and party.
20/10/97	25 0 20	"	VI.	"	"	R. T. Stewart and T. Taylor.
3/2/98	39 3 20	"	XIV.	Chatton	"	John Marr.
3/2/98	27 1 2	"	"	"	"	William Little.
3/2/98	9 0 34	"	V.	Wendon	Break-'em-All	Otago Syndicate (Ltd.).
6/3/94	66 3 0	"	I., IV., VII.	Nokomai	Sew Hoy Hydraulic Sluicing Claim	Sew Hoy.
6/3/94	61 2 0	"	VII.	"	Kum Poy Hydraulic Sluicing Claim	Kum Poy.
26/6/97	28 3 0	"	II.	Wendon	Landslip Hydraulic Sluicing Claim	J. White and A. McIvor.



*Macerwenua.*

A considerable number of miners find profitable employment in sluicing the terraces both in this district and at Livingstone. The stripping is heavy, and the wash of no great thickness. The whole of the available water is used for sluicing at the different claims, and in some cases the washdirt is taken out by driving.

The Mountain Hut Water-race has been completed as far as Thompson's Creek, but as the country between that point and the field is uneven, and a large creek intervenes, the gorge of which is of great depth, the cost of completing the remainder will be considerable, and some time must elapse before water can be brought on to the field.

*Naseby.*

Work is carried on by small parties at Speck Gully, Mulholland's Gully, Robinson's Gully, and Enterprise Gully, while in the main gully Inder Brothers, J. Hoare, Baxter and party, and several others are working their claims on the elevating system.

Guffie's claims, which are situated about a mile and a half below the township, are being worked on the elevating principle, and the owners have now erected a dredge, which will work in addition to hydraulic elevating.

At Kyeburn, Hyde, and Macrae's little improvement is shown in the condition of the industry, the scarcity of water being a great drawback. The Taiari Sluicing Company are erecting an excellent plant on their claim, and will shortly be at work. Bride and party are sinking a shaft on the old workings near the Hyde Township, and the prospects are so favourable as to induce them, if practicable, to undertake extensive development works for drainage purposes.

At Hamilton's, Upper Taiari, and Black's mining matters are much in the same condition as last year.

*Welshman's Gully.*

The Shamrock Elevating Company are carrying on work by elevating on their claim, which is situated about a mile from the main road to Naseby.

*St. Bathans.*

*Surface Hill.*—The Scandinavian Hydraulic Elevating Company employ nine men.

Gallagher and party (two men) are elevating their claim, with four heads of water obtained from the Scandinavian Company's race.

The few parties who are engaged sluicing are rewarded with very fair returns.

*Ewing's Claim.*—At the time of my visit this claim was idle, on account of the scarcity of water, and the elevator has not yet been moved, the rock which was excavated for the foundation of the elevator having slipped, thus proving its unreliability as a foundation at that place.

*Eagle and Gray's Claim.*—This claim has now been worked down as deep as the tail-race will admit, and, until elevating is adopted as the mode of working, very little more can be done.

The M and E Water-race Company has recently put a powerful elevating plant on the ground, and with improved machinery and economic working a prosperous future should be in store for the company.

Mr. John Ewing has recently erected a new and improved apparatus for transporting the larger portion of the rough tailings from sluice-boxes.

Gannon and party are working their claim by elevating.

Mr. Ewing's claim at Cambrian's is also in full swing, and the yields have been satisfactory.

Other parties working in this locality—Gray and Fordham, Davis and party, and others—have had payable returns.

*Matakanui.*

Sims and Morgan (four men), Ewing and McConochie (nine men), Undaunted Gold-mining Company (twelve men), Sugar-pot Company (six men), Matakanui Water-race Company (eight men), and Sheenan and Barron (two men): the above parties are working in this locality, and appear to be doing very well.

The amalgamation of the Undaunted and Mountain Race Company has now been accomplished, and a strong company formed, whose prospects would appear to be satisfactory.

*Ophir Deep Lead Gold-mining Company, Limited, Ophir* (Area, 50 acres).—A shaft has been sunk 7 ft. 8 in. by 4 ft. 8 in., divided into two compartments, to a depth of 145 ft. Operations are to be commenced on a 4 ft. 6 in. bed of wash at 100 ft. from the surface. Steam-power is employed for winding. A puddling-machine and plant for breaking the wash, and sluice-boxes for gold-saving, are now being erected.

*Cromwell.*

A number of men are doing well at Quartz Reef Point.

*Lowburn.*

*Chapman's Claim.*—Two men are driving out the washdirt under the terraces to the left of the Clutha.

Tallman and party and Bethune and party are also engaged in the same locality.

A few parties are working at the Five-mile and neighbouring gullies.

*Cardrona.*

A few small claims are being worked about the township, and in some cases good wages are being secured. A party of tributers are working a claim near the Cardrona Hotel, with satisfactory results.

Some six men are employed at Criffel Face. The New El Dorado Company has taken up a 50-acre claim.



*Bannockburn.*

The water-supply being limited, only a few men are at work, and no exceptional finds are reported.

Weir and party have a 24-acre claim at Motatapu.

*Kawarau.*

Although a number of dredging claims have been taken up, none are at work as yet, the difficulties in obtaining the necessary machinery precluding the possibility of early operations being undertaken. The same remark will apply to the claims taken up on the Cardrona River.

*Clyde and Alexandra and Molyneux.*

Several parties of men are working on the shallow ground on the Dunstan Commonage between Clyde and Alexandra, the ground being worked under considerable difficulties.

At Springvale Messrs. Gartley Brothers are doing well, and several men on Tucker Hill are also reported to be profitably engaged.

*Ewing's Claim, Bald Hill Flat.*—The plant is now being erected above the Last Chance Claim. The water is obtained from Coal and Butcher's Creeks, and is stored in a dam 100 ft. above the claim. Ten men are employed.

*Last Chance Claim* (Messrs. Simmons and Hesson, owners).—Operations at this claim have been hampered by the scarcity of water, which is obtained from Shingle, Chasm, and Gorge Creeks. There are 3,000 ft. of piping in use. Ten men are employed.

*Carroll and Lynch's Claim* (Area, 16 acres).—A water-race seven miles long from Gorge Creek brings six Government heads of water on to the claim, with a pressure of 200 ft. There is 15 ft. of wash at the face, with an overlay of 5 ft. of clay, which is sluiced off. Six men are employed.

*Bald Hill Flat.*—Wilkinson's claim, of 5 acres, is immediately above that occupied by Mr. John Ewing. This claim has been at work steadily for the past twenty-seven years. The gravel is ground-sluiced. A considerable amount of work is entailed in the maintenance of the tail-race.

*Manuel's Claim, Coal Creek Flat.*—This claim is worked by sluicing, but a hydraulic plant is to be erected.

*Wallace and Party's Claim.*—This claim is situated a short distance above the last-named claim. Here a small hydraulic elevator is used, having an 80 ft. pressure. Two heads of water are supplied.

*Pleasant Valley Gold-mining Company.*—This company is reported to have had a very prosperous year. The claim, which is situated on the bank of the Clutha, above Coal Creek, is supplied with water from Elbow Creek. The water-race has a capacity of four to six sluice-heads, with 150 ft. pressure. The gravel here being largely intermixed with heavy stones, a 4-ton crane was erected to effect their removal. Ground-sluicing has hitherto been employed, but an elevating plant is to be erected.

Wilson and party and James and party are also engaged in sluicing operations, the water being obtained from Cross-reef Creek.

*Roxburgh Amalgamated Mining and Sluicing Company.*—This claim, which is on the east side of the Molyneux River, near Roxburgh, is worked by hydraulic sluicing and elevating. Two nozzles and two elevators are at work, and another elevator is used for drainage purposes. Twenty-five men are employed on claim and race.

*Hercules Nos. 1 and 2.*—This claim is now owned and worked by Mr. John Ewing. Two elevators are at work, one with eleven heads of water and a 480 ft. pressure and the other with thirty heads, having a 520 ft. pressure. The pipes used are 18 in., 11 in., and 9 in. in diameter. The depth of the gravel from the surface to the bed-rock is 60 ft., and it is elevated to a height of 66 ft.

Loudon and party and others, working adjacent to this claim, have done fairly well.

*Ewing's Claim, Anderson's Flat.*—Prospecting operations have been carried on by means of the Vincent County Council's boring-rods, but, the rods not being suitable for the class of country, work has been postponed.

*Island Block Extended Claim, Miller's Flat.*—This company, having purchased the Golden Run Company's claim, has been at work during the year, but the poor supply of water has resulted in a considerable loss of time. It is intended to raise the dam, and with an additional supply of water the company's returns should be materially increased.

Gunton Brothers have done fairly well on their claim at Craig's Flat, and several other parties are working the banks of the river, with varying success.

Eddie and Kirkpatrick's claim, six miles above Beaumont, still continues to be steadily worked. The water-pipes in connection with the water-race give a pressure of 850 ft., the pipes being 22 in., 17 in., 15 in., 11 in., and 9 in. in diameter. The tables used are 3 ft. in width. Angle-iron riffles are laid crosswise over cocoanut-matting.

*Beaumont Local Industry Co-operative Mining Company (Limited).*—This company intends to work the alluvial flats up the Molyneux River by hydraulic sluicing and elevating. A race three miles and a half in length from Beaumont Creek brings twenty heads of water 450 ft. above the claim. Twelve men are employed.

*Lawrence.*

*Blue Spur and Gabriel's Gully Consolidated Gold Company (Limited).*—Mr. Howard Jackson, general manager for the company, gives the following particulars of work done, &c. :—

As the work progresses the central portion of the mine maintains its rate of productiveness, Nos. 1 and 2b paddocks are as good as in the past, while the flanking paddocks Nos. 1a and 2, which represent development and stripping, water down the total output seriously. During the

year it has been necessary to make considerable alterations in the working plant. No. 1 elevator has been raised 10 ft., lifting now a total of 68 ft.; No. 2 raised 5 ft. 6 in.; and No. 2B, which works in series, has been moved some 200 ft. nearer the working-face, and now lifts the dirt 43 ft.; No. 2 lifts 69 ft.: making a total lift of 112 ft. This readjustment of the working plant has rendered necessary extensive alterations in the position and alignment of the supply-pipes, and in each case increased efficiency was secured. The net value of the year's output of gold has proved to be £3 19s. 3½d., but for the purpose of the subjoined tabular statements I have adopted £3 19s. as the value. Total quantity of gold won, 3,163·9 oz. = £12,497 8s. 1d. Last year I was fortunate enough to be able to show a decrease in expenditure on the preceding twelve months; this year the total expenditure in the colony has slightly increased. The cost of production represented 43·65 per cent. of the value of the gold won during last year; this year the cost has risen to 50·15 per cent.—that is to say, the expenditure is virtually the same, while the productiveness of the mine has been less for the period. The head-races have given but little trouble during the year beyond the constant attention required to keep long ditches in working-order, and owing to the prolonged and severe drought the races brought in a much-reduced supply, as shown by the following statement of the quantity of water used, expressed in hours of sluicing time: No. 1 division—1896–97, 3,985·5 hours; 1897–98, 3,207·5 hours: No. 2 division—1896–97, 3,931 hours; 1897–98, 3,954 hours. Totals—1896–97, 7,916·5 hours; 1897–98, 7,161·5 hours. The two main items of expenditure are as last year. Wages and explosives and the cost under these heads is shown below: No. 1 division—Wages, £1,586 13s. 9d.; explosives, £265 2s. 6d.: total, £1,851 16s. 3d. No. 2 division—Wages, £2,408 14s. 10d.; explosives, £247 1s. 2d.: total, £2,650 16s. Grand total—Wages, £3,990 8s. 7d.; explosives, £512 3s. 8d.—£4,502 12s. 3d. About 7,500 lb. of roburite has been used. Taking the net value of the gold at £3 19s., it has cost for labour and explosives—No. 1 division, 1,110·4 oz., cost £1 13s. 4d. per ounce, £1,851 16s. 3d.; No. 2 division, 2,053·5 oz., cost £1 5s. 9½d. per ounce, £2,650 16s.: total, 3,163·9 oz., cost £1 8s. 5½d. per ounce, £4,502 12s. 3d. This is an increase of 2s. 0½d. per ounce over last year's results. The following is a statement of work, &c., for the year 1897–98:—

—			Hours Sluicing.	Cement.	Gold.	Value per Cubic Yard.	
				Cub. yds.	Oz.	Gr.	d.
No. 1 division	...	...	2,636	70,117·6	1,085·7	7·43	14·68
No. 1A	"	...	571·5	10,001·2	24·7	1·19	2·34
No. 2	"	...	1,146·5	38,178·4	555·8	6·99	13·8
No. 2B	"	...	2,807·5	84,225·0	1,497·7	8·53	16·86
			7,161·5	202,522·2	3,163·9	...	...

*The Local Industry Gold-mining Company.*—This company's plant is now being removed to Rocky Point, Gabriel's Gully. A storage-dam of large capacity has been erected. The work done during the year was satisfactory. They won 270 oz. of gold, and paid a dividend of 1s. per share.

*Munro's Gully.*—Mills and party are working their claim by elevating to a height of 25 ft. The party is now termed the Tuapeka Creek Gold-mining Company.

The Cornishman's Claim, to the northwards of Blue Spur, is also being worked by means of the elevators. As the pressure of the water is not strong, operations are carried on from three floors.

#### *Weatherstone's.*

Smyth, Adams, and Donlan, known as the "Golden Rise Mining Party," have increased their area during the year, and now hold a special claim of 73 acres. They have an elevating plant, and have been working steadily, with satisfactory results.

#### *Waitahuna.*

The Norwegian Claim has been working continuously during the year, and the results are said to be satisfactory. Twelve men are employed.

Ferris and party have been working on their claim for an average yield.

*Sailor's Gully Gold-mining Company (Limited).*—This party have gone to a considerable expense in enlarging water-races, laying down pipes, and constructing dams. For the past three months they have carried on sluicing operations, the returns being such as to induce confidence that the claim will turn out satisfactorily.

Hagan and party and Quilter and party are working old tailings in the bed of the gully, and most of the other claims in the locality have been doing fairly well.

*Manuka Creek.*—Stewart and party hold several claims, and have done a considerable amount of work in bringing in an additional water-supply. The claim being situated at a high altitude, very little can be done in the summer through the scarcity of water, but during the remainder of the year a great deal of ground is turned over, and it is hoped that in the present winter the yields will be satisfactory.

#### *Waipori.*

*The Amalgamated (Waipori) Deep Lead Gold-mining Company's Claim.*—This claim is soon to be worked; the mortgagee, having purchased the property, is preparing to work the claim in a systematic manner.

*Bakery Flat Sluicing Company.*—This company have got their new claim into good working order, and are said to be obtaining satisfactory returns, 71 oz. of gold having been obtained for one

month's work. This claim includes all the available river-flat above the Jutland Flat Dredging Claim. During the year an attempt was made to reach the gutter on the main bottom, which lies underneath the false bottom on which operations are at present carried on. The efforts, however, did not prove successful, for after 51 ft. had been reached sinking was abandoned, and the plant withdrawn.

Pearsall and party have a water-race four miles and a half in length, and are elevating from 7 ft. to 8 ft.

Sharp's claim is also the scene of elevating operations.

Robinson and party, Parker and party, and three or four others are driving out the washdirt in their claims.

A few Chinese are also employed in this district.

#### *Shotover.*

*Lake Wakatipu, Moke Creek, and Twelve-miles.*—Only a few men are engaged in alluvial mining in these districts.

The Moonlight Sluicing Company has done fairly well, and other large claims are on the same run of gold.

#### *Arthur's Point.*

Walden and party purchased the Sew Hoy Race, above the bridge, and are now making preparations to hydraulic the Big Beach, formerly worked by the Sew Hoy Company.

McCarron and party are also sluicing in this neighbourhood.

*Deep Creek.*—Collins and party are bringing in a race, which will be four miles in length and provide two heads of water, for hydraulicing the river terraces.

Baldwin and Murdoch are engaged in sluicing about four miles up the creek.

*Maori Point.*—Trainer and party (six men) are bringing in a race of four heads of water from Maori Gully to hydraulic the terraces near Maori Point.

Davis Brothers are also carrying on extensive works on their claim on the north side of the Shotover, at Maori Point.

The Pactolus and the Enterprise Claims are both being worked on the elevating principle. They are situated on the left bank of the Shotover, several miles up from Skipper's Creek.

#### *Skipper's Point.*

The claim, formerly known as the Londonderry, is now managed by Mr. W. Scott, who has brought in eight heads of water from Skipper's Creek, a distance of four miles, to sluice the Londonderry Terrace and Skipper's Terrace. A tail-race is also being driven in the rock, which is 400 ft. in length. Twelve men are employed.

#### *Arrow River District.*

*Arrow Falls Claim.*—This claim is now being successfully worked. The whole of the wash to a depth of about 60 ft. has been washed away through the tail-race, and the rock bottom of the river is now easily stripped. At the time of my visit, on the 25th February last, the manager was sluicing one-half of the river-bed. The main stream of water was conveyed to one of the shafts that communicate with the tail-race tunnel. In the part of the bottom thus partially dry sluice-boxes are placed with a lead to the other shaft. Sufficient water is led from the main body of the stream to sluice all the gravel that can readily be washed into the sluice-boxes. The larger boulders and stones are removed from the wash and stacked on the part of the bottom already cleaned, the smaller stones and gravel only being allowed to be carried down the shaft. When a considerable area of the bottom has been stripped on one side, the sluice-box is removed to the other side, and the water of the river diverted to the side already worked. This is also used for the stacking of stones. The place, at the time of my visit, presented the appearance of two channels separated by a large wall of stones and boulders, a stream of water flowing down one of the channels direct to a shaft, and in the other a sluice-box in full operation, the gravel being washed into it by the water diverted from the main stream further up, and passing down the other shaft. The method seems to answer well so far. The manager informed me that on the occurrence of a high flood the shaft-openings are closed, and the whole of the workings are covered with water until it rises to the level of the natural dam and flows over. When the flood is past, the gates closing the shafts are opened, and the whole place is again freed from flood-water, the *débris* that may have accumulated in the workings removed and washed away, when the usual work is again carried on without much loss of time. Mr. Millar, the manager, gives me the following account of and history of the claim :—

The Arrow Falls Mine is situated three miles and a half from Arrowtown, up the Arrow River. The reason it got the name of Arrow Falls is that a large landslip took place some years ago and filled up the bed of the river for a depth of 100 ft., causing the present falls. It must have formed a large reservoir, which has been filled during the heavy floods for a distance of a mile and a half with the gravel from the bed of the river from a higher level. This ground was taken up about twenty-five years ago by a miner named Carl Hein, who afterwards sold it to an Arrowtown company, who, failing to make it a success, sold it back again to Carl Hein, who, after working it for several years without success, sold it to a Melbourne syndicate for the sum of £350. The syndicate started driving a tunnel from the bottom of the falls, 9 ft. high and 9 ft. wide on the bottom, for a distance of 1,100 ft. in the solid rock, at a cost of £5,000; and then sinking two shafts in the bed of the river to meet the end of the tunnel at the depth of 100 ft., which they successfully completed at a cost of £3,000, including timber and machinery. The syndicate not having money to carry on the works, it was sold by the mortgagee, and bought by J. Miller for the sum of £3,000, who started sluicing, and got down within 10 ft. of the original bed of the river when the floods destroyed one shaft. Another shaft had to be sunk into the rock, which, with other drawbacks, took two years,

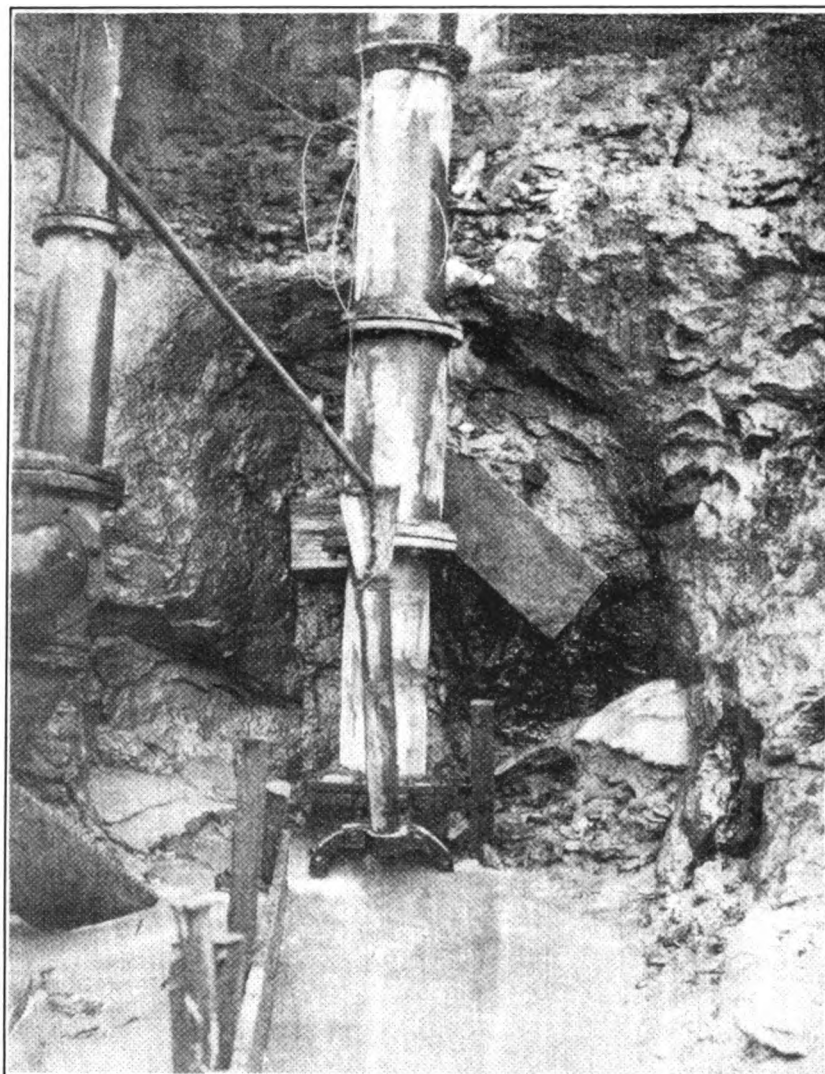


**Round Hill Mining Company.**  
**Continuation of Pipes to supply Elevators.**

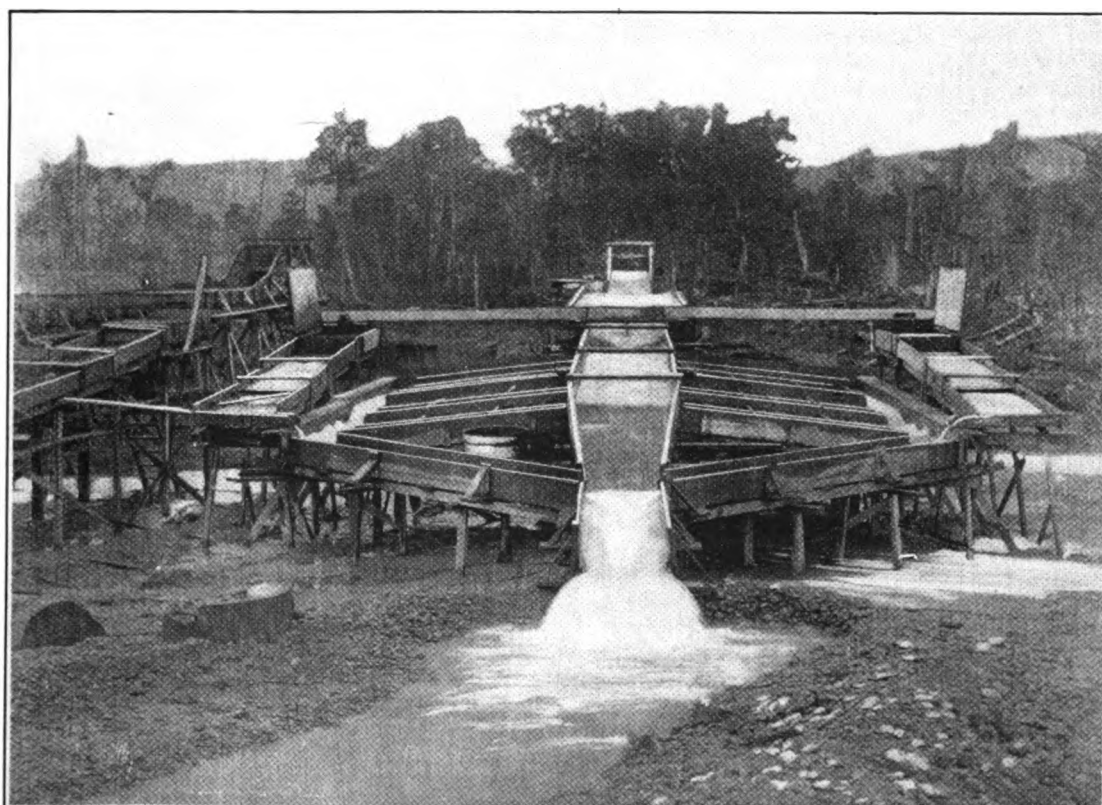


**Round Hill Mining Company.**  
**Penstock at head of Pipes.**





**Round Hill Mining Company.**  
**Elevator in Position.**



**Round Hill Mining Company.**  
**End of Sluice-box and Tables.**





and then the Colonial Bank closed on the mortgage. It then stood in liquidation for over twelve months, and was bought by Mrs. Jessie Miller in May, 1897, for the sum of £100, and, after an outlay of another £100, got on to payable gold. Now it is formed into a company of twenty thousand shares paid up to £1 a share, and has every prospect of being a good property.

Anderson and party are working their alluvial claim, situated at Eight-mile Hill, junction of Eight-mile Creek and Arrow River, being the highest terrace workings on the Arrow. The workings are from a tunnel 350 ft. in length. The wash-gravel is intermixed with ironsand and Maori stones. This is conveyed through the tunnel in trucks, and afterwards sluiced through a rock tail-race. The returns of gold are satisfactory.

#### Arrowtown.

Work in hydraulic elevating and sluicing is about to be carried on in the bed of the Arrow River, near Arrowtown, by an Invercargill company, which has secured extensive water-rights. Mr. Robert Hay, of Dunedin, was on the ground for the purpose of reporting on the property at the time of my visit, on the 24th February last.

#### Macetown.

Mr. Lester is sluicing his claim. At the Eight-mile Hill Reid and party have a race a quarter of a mile in length, and 2,000 ft. of 7 in. piping to supply the nozzle. The stripping here is 60 ft. thick, and the washdirt from 4 ft. to 10 ft. in thickness.

#### Waikaia.

*Argyle Hydraulic Sluicing Company.*—This company hold a claim of 6 acres on the higher terrace, and a special claim of 100 acres on the Argyle Creek and flats. Ground-sluicing is carried on at the higher claim, where three men are employed; and hydraulic elevating is the process in use at the lower claim, where twelve men are employed, on three shifts. A paddock of  $1\frac{1}{4}$  acres has been cleared, and a fresh area of  $\frac{1}{4}$  acre is now being worked, where the depth is about 35 ft. It is found preferable to work to a depth of 15 ft. to 17 ft. until a considerable portion of the surface and wash-gravel has been stripped, and afterwards the remaining depth of gravel down to bed-rock. The water-race is carried to within a mile of the workings, and from thence pipes are used to convey the water; 15 in. mains are first employed, which are afterwards reduced to 13 in. size. The service-pipes to supply the elevators are 11 in., 9 in., and 7 in. capacity. The quantity of water used is nine to ten sluice-heads. The throat-piece of the elevator is a casting 7 in. in diameter, which is renewed as soon as it becomes too large for economical working. The sluice-boxes are each 12 ft. in length. Angle-iron riffles are used over cocoanut-matting in the side-tables, which are 3 ft. in width. The tail-box for 15 ft. has got perforated iron plates over the cocoanut-matting. There is a full length of boxes and tables of 102 ft., the fall given being 8 in. to 12 ft. Ten men are employed at this work, and one man on the maintenance of the water-race. The returns from this claim, the manager (Mr. John Stewart) informed me, are satisfactory, and very little time was lost through scarcity of water during the year. The water-race has a fall of 8 ft. to the mile, and is of such dimensions as will convey a much greater quantity than is at present used. The pipe branch which is used for hydraulic sluicing is of 13 in. and 11 in. size, and the length of the pipes 800 ft., with a head of 80 ft. Ten sluice-heads are used at this place. The head of water used for elevating is 350 ft. Thirteen men are employed.

*Waikaia Gold-mining and Water-race Company.*—Three shareholders occupy an area of 63 acres 1 rood 18 perches. They have a water-race eleven miles in length brought in from Steeple Creek. In this race there is a siphon of 14 chains in length, the pipes being 22 in. in diameter. Sixteen sluice-heads are used in ground-sluicing. There are two 5 in. nozzles for breaking up the face, which consists of clay from the surface down to the wash, which is 14 ft. in thickness. The head of water is 80 ft. This company, whose works are situated on Scrubby Terrace, obtained 206 oz. for the year, which must be considered a good return, seeing that the company were only able to work for about six months, owing to the scarcity of water.

*Winding Creek Claim, formerly Break-'em-All Claim* (Owners, Waikaia Freehold Gold-mining Company).—This claim comprises the following areas: 50 acres freehold, 30 acres leasehold, 28 acres tailings area, and ordinary claims; total, 108 acres. The ground is too deep for ordinary sluicing—i.e., in respect of getting rid of tailings—and an ordinary dredge-pattern elevator was put on about the year 1880. This proved a failure, owing to the insufficient water-supply available to work it. The claim has been practically idle for fifteen or sixteen years, with the exception of intermittent hand-working on a small scale. It has recently been taken up by the Otago Syndicate (Limited), who propose working by hydraulic elevators, and are now inviting tenders for the construction of the necessary works in connection with the water-supply. It is stated that fifty heads of water are to be brought in, and that a large amount of capital is to be expended.

*Kennedy's Claim, Waikaia* (Area, 4 acres).—Four men are employed, and the claim is apparently doing well. The washdirt is obtained by driving. The depth of the ground from surface to bed-rock is from 60 ft. to 100 ft., and about 6 ft. or 7 ft. lying on the bottom is payable, yielding from  $2\frac{1}{2}$  dwt. to 3 dwt. of gold to the cubic yard.

*The Lion Gold-mining Company.*—Work on this company's claims, which were formerly owned by Messrs. Erskine and Thompson, has taken the form of cutting a water-race from the Roaring Lion Creek to work the property. Thirty men are employed on this work.

#### Parrawa.

The Parrawa Water-supply and Gold-mining Company (Limited) occupy a claim of 77 acres 1 rood 29 perches, situated on a terrace near the Mataura River, about two miles and a half from the railway-station. A water-race is brought from Fiery Creek, a distance of two miles and a half, and carried by siphon across the Mataura to the claim on the terrace. The pipes are—9 in., 400 ft., and 13 in., 3,600 ft. Three sluice-heads of water are available. A  $4\frac{1}{2}$  in. nozzle is used. The sluice-



boxes are 48 ft. in length, with iron riffles over cocoanut-matting. The wash is from 70 ft. to 90 ft. in height, and contains numerous boulders up to 5 or 6 tons in weight. These cause additional labour in handling, as they have to be blasted with dynamite before removal. The returns are not payable, and the claim is to be let on tribute to the men who had been employed on wages. They intend to convey the water to a place on the terrace where the wash is not so deep, and where the boulders are fewer in number.

*Nokomai.*

*Sew Hoy Claims* (Area, 130 acres).—These claims are worked by the Nokomai Hydraulic Sluicing Company, one elevator being used. The gravel-wash from surface to bed-rock is about 45 ft. in depth, large stones being in this place absent, thus allowing the gravel to be more readily passed through the elevator. Eleven sluice-heads are used for elevating to a height of 65 ft. The boxes are 100 ft. in length. Venetian riffles over cocoanut-matting are used. The boxes have a fall of 6.5 in. in 12 ft. A dynamo, driven by a small Pelton wheel, is used for producing electric light for night-working. Upwards of twenty miles of water-races have been constructed, which, with the necessary pipes, siphons, and hydraulic plant, cost £15,200. During the dry season the water-supply is insufficient to allow of work going on, and one month yearly is lost from this cause. Twelve Chinese and eight Europeans are employed.

A company has been formed at Invercargill to bring in thirty sluice-heads of water to work the Victoria Gully, which is situated some distance down the Nokomai from Sew Hoy Claim.

*Colac Bay District.*

*Round Hill Mining Company (Limited).*—This company is carrying on extensive operations by elevating and sluicing. A large area has already been worked out, but several years must elapse before the ground commanded by the present water-supply can be exhausted. The situation of the property is in a dense bush, about four miles from the railway-station, and can only be reached by a wooden tramway, the trucks and trolleys being drawn by horses. The village, which at one time was largely inhabited by Chinese, has been almost deserted by them. About forty of those people are all that is left, and these did not appear to be mining in the neighbourhood. On the 16th February, during my visit, Mr. George Lee, the manager, and Mr. Alfred Reynolds, the secretary of the company, furnished me with the following history of the company, and with particulars of the water-races and plant used in the mining operations:—

“The Round Hill Mining Company (Limited) emerged from the original company started under the style of the Round Hill Syndicate (Limited), registered in England, with Mr. George Evans as general manager in the colony, and Sir Robert Stout, the Hon. W. J. M. Larnach, C.M.G., and John White, Esq., barrister, as a local board of advice in the syndicate. The same board acts for the company, with John White, Esq., as managing director, and now also as attorney in the colony. The syndicate was floated in England by Mr. George Evans, the local promoters' company receiving a number of shares, in consideration of the expenses incurred by it in getting the various mining rights under offer, &c. Mr. George Evans retired from the management in 1895, and Mr. George Lee, the present manager, was placed in charge in the same year. The head office is now in Liverpool, and the colonial registered office at Round Hill, near Colac Bay, in the South Island. The nominal capital is £50,000, in ten thousand £5 shares, of which 5,534 shares have been allotted, and on which £2,670 has been called up. In March, 1891, the water-races originally held by various miners were taken over by the syndicate, having been previously purchased in most cases, and arrangements made for leasing and purchasing in the case of Anderson's and Erskine's race, of which the company now holds a one-third share, originally held by Mr. Martin Anderson, Robert Erskine, Esq., holding the other two-thirds still. The principal water-races purchased were Port's, Berndtson's, Turnbull's, Ward's, and Bruce's. The races purchased cost over £10,000. Additional purchases now bring the cost up to £13,119. The enlargement of Port's race in 1897 came to £2,246, and the extension along the north-east slope of the Longwood Ranges, at the end of February, 1898, comes to £1,189, bringing the total cost to this date of the water-races up to £16,554. The length of Port's race is nearly thirteen miles from the head of the pipe-line; Berndtson's, fourteen miles; Anderson and Erskine's, fifteen miles; Turnbull's, five miles; Ward's, three miles from the end of Port's to the Cascade Creek; Bruce's races, two and three miles each; the extension partly finished from the end of Port's, eleven miles, and the connecting-race, two miles: making a total of sixty-eight miles. This does not include about eight miles of branch races. The total carrying-capacity is thirty-six Government heads of water, Port's contributing twenty-six heads, carrying Ward's water, and the extension; Berndtson's, five heads; Anderson's, a head and a half; Turnbull's, two heads; Bruce's (two races), a head and a half. The water from Berndtson's, Anderson's, and Turnbull's races is taken to Port's race, near the head of the main pipe-line, by a connecting-race, and from Port's race enters a 27 in. main pipe-line at an average height or head of 300 ft. above the elevator seats and intakes. The main 27 in. pipe-line is 90 odd chains long, and is made of the best annealed steel plates, of 14 and 10 B.W.G., being joggled at each section to insure smoothness internally, and thus reduce friction. The distributing pipe-lines from the main one consist of an 18 in. line of 30 chains, lines 13 in. a mile and a quarter, 11 in. and 7 in. pipes, mains, and all making a total of two miles and a half of pipe-lines. The whole of the mains and distributing-pipes and plant has cost the company to date £6,420. The pipe-making plant and electrical appliances cost £370, making a total of £6,790 in general plant used by the company for the recovery of gold. All the main 27 in. and 18 in. pipes were made on the premises, and other plant and pipes are regularly made when required. The number of elevators working is three, and a fourth one is being set up, the gold-saving tables set up being five. These have two sets of riffles, each averaging 48 ft., with 10 ft. of riffles at the head. These have cocoa-matting beneath, and are succeeded by 24 ft. of perforated plates, allowing the light gold and sand, &c., to pass into a set of wooden side-tables, with fifty-two mats each. The fall on the upper tables covered by the riffles is 6½ in. to the 12 ft. The

lower tables, or side-tables, have a fall of 1 in. to the foot, and the perforated plates  $\frac{3}{4}$  in. to the foot. The gold on the side-tables being daily saved, while the gold on the mats under the riffles is saved periodically, according to the supply of water and nature of ground and operations. The gold recovered is very fine, and has to be amalgamated and then retorted. The elevators used are of 13 in. pipes, with patent oval seats of 16 in. by 10 in. openings, having throats of 3 ft. in height, 6 in. diameter, tapering to  $7\frac{1}{2}$  in., and jets of  $2\frac{1}{2}$  in. These, with a properly regulated supply of water and dirt from the nozzle acting on the face, are capable of lifting to a height of 50 ft., and elevate from 60 to 70 tons of material per hour. An air-injector can be attached, and is generally used to cause a body of air to accompany and naturally surround the water being forced up the elevators, thus minimising the friction along the inner portions of the uptake pipes. The average number of Government heads used to each elevator is 5-434, and on each nozzle working on the face 3-66. The average height of face has been 39 ft., and the average depth of auriferous washdirt 1 ft. 6 in. The ground worked out by the syndicate and company to date is 33 acres, being 2,100,000 cubic yards of material, and has given a return of 7,751 oz. 16 dwt. 15 gr. of gold, valued at £30,425 18s. 8d., and is equal to a recovery of  $1\frac{1}{2}$  gr. to the yard, valued at  $3\frac{1}{2}$  d. per yard. The faces of the claims are usually sandy, covered with clay and heavy timber, carrying small bands of inferior and low-grade washdirt in places, on the lower portion of the field the main rich washdirt being on the false sandy bottoms, and hard fine clay bands constituting the false bottom in places. On the higher levels the rich washdirt is on a main bottom of igneous formation, which generally has been composed of various rocks, feldspathic diorites predominating on the upper field, and apparently merging into decomposed granites, &c. The wash on both bottoms generally is formed of portions of these rocks, mixed with black sands carrying gold and small quantities of platinum, and possibly other precious and rare metals. The company is now constructing a large reservoir, to be filled with the third share of their water from Anderson and Erskine's race, and which is about seven miles from their claims. This will hold when finished about 24,000,000 gallons, and will be a great assistance to their operations. They are also proceeding with an extension of Port's race, to bring in more water during dry weather. This has no other race above, and goes through wet country, which has always a good supply of water available in summer. The number of men generally employed is forty-five. This includes only those occupied about the claims and water-races regularly. When large works are undertaken from twenty to fifty more men are generally employed, and at the present time there are about thirty-five extra hands occupied about the dam and water-races being extended. The syndicate took the water-races over in March, 1891, from the various owners, and started sinking the first paddock on the 9th November, 1891, and when it merged into the present company—in July, 1892—the company carried on its operations, and has continued doing so, generally making a fair profit, and employing this profit in making new plant and improving and increasing its possessions. It has purchased various claims found unprofitable to work by individual miners, and has paid for these to date £814 odd. Most of these smaller claims are unworked, and adjoin their other claims. Their own claims consist of a 21-acre claim about worked out, a 60-acre claim with a few acres worked, the purchased claims coming to about 6 acres. Their renewable water-races number thirty-five, including the main ones. They have over fifty other rights, including the branch races, making a total of over eighty-five mining rights. Their buildings contain sawmill, pipe-making plant, dynamo and electric plant, smithy, and workshop. The machinery is driven by a Pelton water-wheel. Most of the timber they use is now cut up from logs taken off their claims."

*Ourawera Claim.*—The Ourawera Gold-mining Company hold a claim adjacent to the Round Hill Company's land. The ground is similar in character to that worked by that company, and is about 40 ft. in depth. Considerable difficulty is experienced in getting rid of the tailings, the elevator being set to lift 45 ft.

*O'Brien's Claim.*—This claim is worked by the owner, Mr. Thomas O'Brien, who employs one wages-man. The ground is further up-stream than the Ourawera Company's, and is worked by hydraulic sluicing. 400 ft. of 11 in. and 200 ft. of 10 in. steel pipes are used. The owner is satisfied with his earnings. The water used is from his own race.

Vesey and Breck's claim is worked, when water can be got, from O'Brien's race.

About six men find employment in working small claims in this district whenever water is available, and two parties are sluicing near Lake George.

The Chinese also do a little washing and sluicing when water is to be had, but to all appearance the days for individuals getting profitable employment in claims is past as far as this district is concerned.

#### *Orepuki.*

John Barry and Ohler Sorenson and two wages-men are working a claim of 9 acres in the old school-ground. This claim has been worked for seven years, but for the past two years it has not been payable, but is now being worked profitably. There is 40 ft. of stripping, consisting of clay and hard beds of sand. The wash is about 2 in. to 3 in., lying on coarse soft sandstone. The water obtained for sluicing is from a race owned by six claimholders. About twenty men are using water from this race.

A rush has taken place to a piece of land to the northward of King's claim and Wallace's freehold. A shaft has been sunk by R. Ralstone and party. This was bottomed at 42 ft., with about 2 ft. 6 in. of wash. The shaft is 7 ft. by 4 ft., and the prospects are such that they intend erecting a horse-whim for working out the claim, which is named the Klondyke.

Two men have a claim to the westward, and have driven 37 ft. from an open face.

Forbes and party (three men's ground) are ground-sluicing. There is about 20 ft. of stripping, and the wash is from 1 in. to 3 ft. in depth, lying on 20 ft. sandstone.

W. Forbes and party (four men's ground) are driving for the wash, which is about 1 ft. in thickness.

Horner's claim (one man's ground) and Currie and King's claim (two men's ground) are both sluicing.

Evans and Son (two men's ground) have brought in a water-race from the Waimeamea Creek to work their claim by ground-sluicing.

Two other claims (two men's ground each) are also worked by ground-sluicing.

Weston's claim (two men's ground) is also worked by ground-sluicing; but, as the wash on the bottom is getting below the level of the tail-race, a wooden box is used for elevating the wash for  $7\frac{1}{2}$  ft.

Several other parties are working in the district, and McLean's claim is being sluiced by a party of twenty Chinese.

Two or three parties are working driving for the wash in the vicinity of the coal-mine.

The wash being generally of no great thickness, and covered by from 20 ft. to 40 ft. of stripping, there is no doubt a considerable area of ground that will yet be worked in this district; but, on account of the difficulty in getting a sufficient quantity of water, a large number of men cannot be profitably employed.

#### *Southern Beaches and Waiau.*

*Fortrose.*—A few men are working on the beaches and sandhills north of Fortrose. The results are not likely to be promising, the stripping being too heavy and the wash poor.

*Waiau River.*—About twenty miles up the river, near Blackmount Station, a Dunedin company propose to build a dredge. A few prospectors are working opposite Clifden, where the new suspension-bridge will shortly be erected. North of the Waiau there are several sluicing claims taken up, and in some cases the holders are bringing in water. One of the races will be some twenty miles in length.

*Waiau Beach Hydraulic Elevating Company.*—Operations are being vigorously carried on in this company's mine, and the prospects appear to be extremely promising. It is hoped that the enterprise of the company will meet with its reward.

#### *Stewart Island.*

*Pegasus.*—Desultory prospecting operations have been carried on during the year at Pegasus. A few prospectors are searching for gold and tin.

### DREDGING.

The interest evinced in dredging operations continues with unabated vigour. Claims have been taken up not only in the rivers, but in the terraces and flats adjacent thereto, and also in alluvial flats where the depth of the ground had hitherto been the chief obstacle to the auriferous wash being worked by other methods.

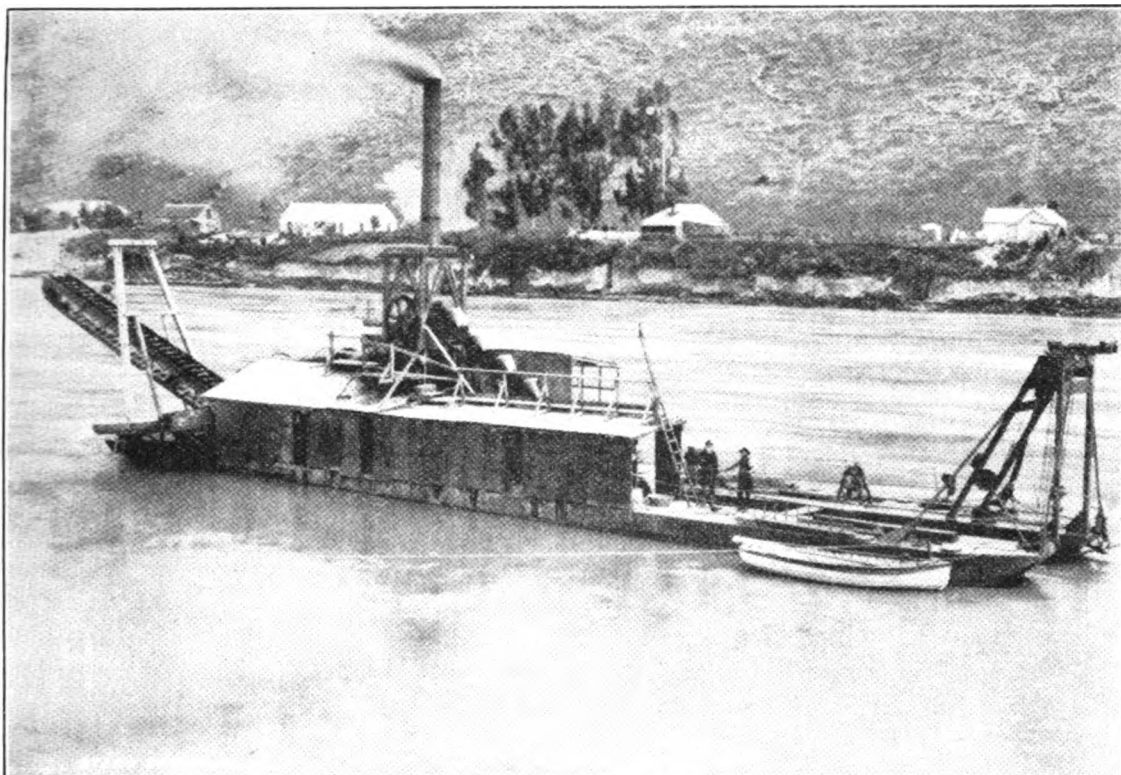
Dredging operations are now being conducted in the stream of swift-flowing rivers, such as the Clutha, Kawarau, and Molyneux; and in the lesser rivers, such as the Kyeburn, Manuherikia, Tuapeka, and Glenore; as well as in smaller streams and old river deposits. The depth from which material is elevated being from 25 ft. to 30 ft. in the rivers, and various depths from 6 ft. to 35 ft. in other places, it will be seen that dredges of differently modified construction are required for the changed circumstances that occur in different localities.

It has now been clearly demonstrated that dredges can be successfully handled in places where the water-supply is limited. A large paddock is first excavated to contain water sufficient to float the dredge. Operations are then commenced by working one side of the basin. The gravel, after being washed, is discharged behind the dredge, either by an ordinary flume, or when depth increases the larger stones are conveyed by an elevating process and stacked a considerable distance from the stern of the dredge. The finer gravel only is allowed to be discharged without being elevated. The work done enlarges the basin in which the dredge floats, thus giving more room for future movements, and should the water become thickened by continuous use there is in most places a small stream or creek within reasonable distance from which water is run into the pool in which the dredge floats. Prior to being worked by the dredge an area of 5 or 6 acres presents an ordinary level appearance, and after being worked, although perhaps not level, is in such a state that it could be harrowed and grass-sown, if necessary. It thus follows that in working gravels by this process no very great damage is done to the land, and the streams are not polluted to any extent, nor filled up with gravel, as in the case of ordinary sluicing, the whole of the material being raised, washed, and again deposited with very little eventual surface change.

The marked advantage in dredging compared with sluicing or other methods is that it enables quantities of material to be first elevated and afterwards deposited at a less cost than has so far been possible by any mechanical process in use, except in places where ample water-power can be applied.

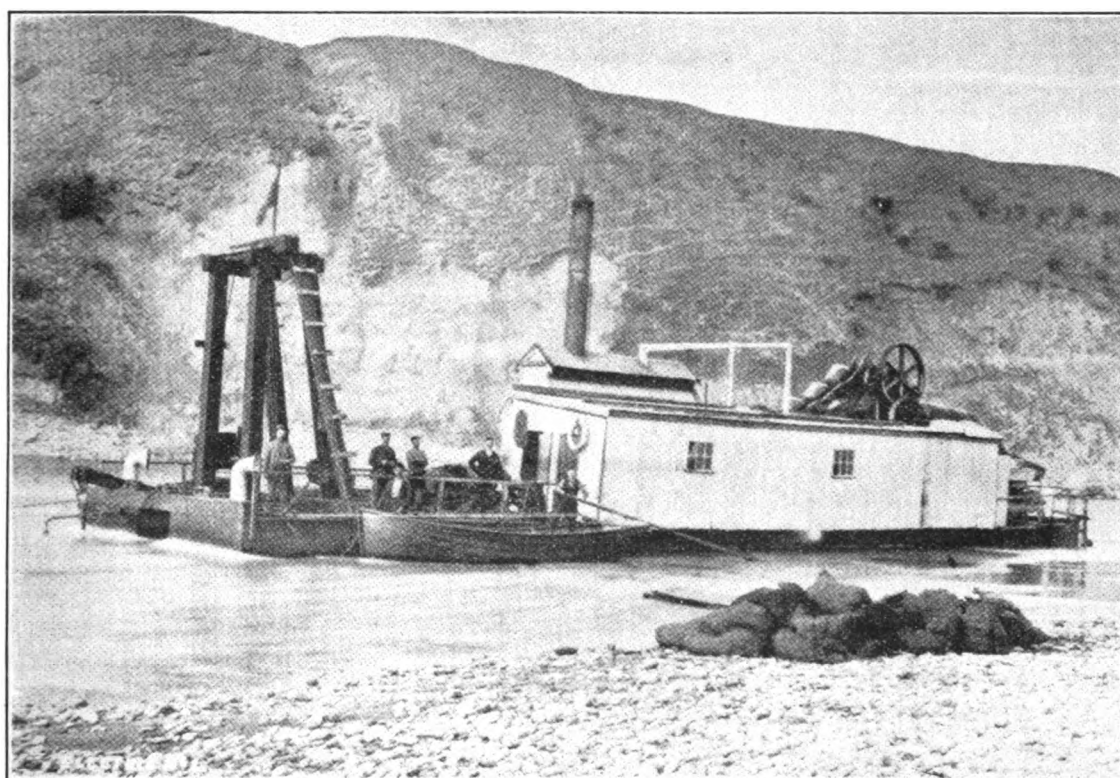
In dredging in river-beds attention is being further directed to extending operations by working the gravel in the banks above water-level. There are many claims taken up that have an apparent large quantity of material to work on, but, so far, no effort has been made to ascertain the possible quantity of gold that may exist in the gravels. In order, therefore, to enable a fair estimate of the value contained in the ground to be made the owners should cause sufficient exploring work to be done for that purpose before commencing to build expensive dredges, there being a general tendency to incur expense in providing for the treatment and handling of the material, whilst at the same time the quantity and value have not been determined in a practical way.

As much of the ground suitable for dredging is what is generally designated wet ground, a certain amount of expense must be incurred to sink prospecting-shafts, whether by hand or by the aid of steam- or water-power. It appears to me that, for the purpose of testing the gravels by sinking when the water is heavy, it would be of great advantage to use a steam-pump of the Tangye or any other suitable make, and I would point out to those interested that co-operation on the part of various claimholders would be to the best advantage. A suitable plant could be procured at a reasonable cost, conveyed to the ground, and, as very little trouble is attendant on the erection or working of the pumps, they could be in use in a day or two. The size of shaft being determined, all suitable timber should be prepared and in readiness. Work could then be gone on with in sinking, the gravel from different floors—say, every 3 ft.—being separately stacked on the surface. This gravel could be washed, and the total quantity in each section or floor ascertained, and when the



McEachen, Photo.

Otago Dredge.



Electric No. 1 Dredge.



various heaps were dealt with the total of the whole products divided by the number of cubic yards removed from the shaft would give the value per yard of the material through which the shaft was sunk. This would only give the average value of a very limited area of the claim; consequently, it would be necessary to sink further shafts in such places as would, from local indications, afford a reasonable chance of ascertaining the approximate quantity of gold that the claim would probably contain. When a shaft had been bottomed, the timber could be drawn, and the plant and material removed to a place where another prospecting-shaft was to be sunk.

If a party of men were employed in sinking in this way they would become used to the work, and be able to carry it on so that a prospecting-shaft could be completed at a much less cost than in the case of inexperienced parties of men undertaking the work for each claim. On the contents of the gravel taken from the different shafts being ascertained (and in this the utmost skill and care is required), it will be seen what quantity of material is available, and its value per yard. The dredging engineer should then be consulted as to whether the results given warrant that the gravels could be made to yield profit, and he could then determine what class of dredge would be most suitable.

The great areas of river deposit in the valleys and flats throughout the greater part of the auriferous districts in Otago and Southland that hitherto have not been explored, but which in many instances are known to contain small quantities of gold, are well worthy of being prospected in a systematic manner as above indicated. There is every reason to expect that the result of exploration would show many places to contain sufficient quantities of gold to afford remunerative employment to a large number of men in carrying on dredging-work. This is reasonably to be expected, as in the past the amount of gold required to make a payable prospect was so much more than what is now considered to be payable for dredging. Care, it is to be hoped, will be observed by those embarking in the dredging industry to profit by the hints above given as to prospecting before dredge-building is begun in the working of their claims.

One of the errors fallen into in quartz-mining, especially in the Auckland District during the late boom, consisted in the erection of very expensive machinery for treatment of the products before it was discovered whether quartz in payable quantities existed in the mines or not, and this should, if possible, be avoided. Ill-advised and precipitate action, such as has too often obtained, will tend to materially prejudice the prospects of the dredging industry, the more as it is the expressed intention of those interested to proceed with the construction of many new dredges. However, as before remarked, if due precautions are observed in the direction of securing knowledge of the prospects by preliminary work, the industry will be prosecuted on a sounder basis, and its expansion will necessarily tend to enhance the yield of gold from the alluvial deposits of the colony.

The following abstracts contain lists of claims in occupation for dredging purposes throughout

Otago:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Naseby.</i>						
6/8/96	A. R. P. 43 0 0	Hyde ..	VII., II.	Rock and Pillar	Hyde Dredging Co.	A. D. Silk.
13/10/96	100 0 0	..	III.	Naseby ..	Hogburn Dredging Co. (steam-dredging)	The Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
29/9/96	97 3 30	Naseby ..	I.	Maniototo	Guffie and Co. ..	Ditto.
29/9/96	47 0 0	Kyebrun River, Naseby	II., V.	Kyebrun ..	Kyebrun Junction Dredging Claim	Kyebrun Gold-dredging Co. (Ltd.).
29/9/96	75 0 0	Ditto ..	II.	..	Kyebrun Pioneer Dredging Co.	..
27/10/96	30 0 0	Kyebrun ..	..	..	Mount Ida Dredg- ing Co.	Mount Ida Gold-dredging Co. (Ltd.).
27/10/96	25 0 20	..	II.	..	Naseby Dredging Co.	Mount Ida Gold-dredging Co. (Ltd.).
5/8/97	62 2 36	Cambrian, St. Bathan's	IV.	Swinburn Blackstone ..	..	Black and Beattie.
5/8/97	62 2 29	Ditto ..	I.	St. Bathan's Blackstone	..	W. O. Pitches.
25/8/97	100 0 0	Naseby, ..	IV., VII. III.	Maniototo ..	..	Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
25/8/97	70 1 0	Enterprise Gully, Naseby	III., XVIII.	..	..	James McLaren.
20/7/97	39 2 0	Kyebrun River, Naseby	V.	Kyebrun ..	..	Agnes Wilson.
20/7/97	37 0 0	Ditto ..	..	..	..	Archibald Leckie.
5/11/97	59 3 24	St. Bathan's ..	II. VIII.	St. Bathan's Blackstone	Hawkdun Dream Gold-dredging Co.	Patrick Hanrahan and Ulick Fahy.
21/1/98	92 2 13	Cambrian, St. Bathan's	IV.	..	New Arrival Gold- dredging Co.	John Beattie.
21/1/98	93 0 25	St. Bathan's ..	I.	St. Bathan's	..	John Ewing,
<i>Cromwell.</i>						
13/10/94	80 0 0	Alberttown ..	IV.	Lower Wanaka	..	Andrew Hamilton.
16/7/96	76 0 0	Kawarau ..	I., II.	Cromwell ..	Electric ..	Roy and McGeorge.
6/4/96	41 0 0	..	I.	..	Electric No. 2 ..	..
4/8/96	22 0 0	..	II.	Kawarau ..	..	Allan and Aitken.
20/8/96	22 3 30	..	I.	Cromwell ..	..	W. E. Lane.
1/10/96	55 0 0	Nevis River ..	III.	Nevis ..	..	Thomas Steel.
1/10/96	46 2 0	..	..	..	..	A. D. Silk.
1/10/96	32 0 0	Cromwell Brewery	I. VI.	Cromwell Wakafield	..	Hartley and Riley Beach Co.

## ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Cromwell—continued.</i>						
29/3/97	A. 56 R. 1 P. 16	..	I., III.	Nevis ..	..	Olaf Magnus.
29/3/97	98 0 26	..	I.	..	..	John Mackersey and party.
29/3/97	95 1 5	..	..	..	..	H. W. Flint.
29/3/97	59 0 25	..	XIII.	..	..	Robert Ross.
17/6/97	31 0 2	Bowman Flat	XIV.	Tarras ..	..	G. A. Morris.
18/9/97	52 2 23	..	III.	Nevis ..	..	James Fotheringham.
18/9/97	99 2 16	..	III., XIII.	..	..	Robert Ross and party.
1/12/97	44 2 1	..	XIII., III.	..	..	Henry Schaumann.
12/3/97	9 3 10	Kawarau Gorge	II.	Cromwell ..	..	Magnetic Co.
1/12/97	24 1 10	Kawarau ..	I.	..	Electric No. 3 ..	Samuel Crow.
3/3/98	8 2 0	Cromwell ..	..	..	..	Benjamin McPherson.
3/3/98	7 2 0	..	..	..	..	..
17/9/96	15 0 0	Nevis Crossing	..	Nevis ..	..	Robert Ritchie.
<i>Clyde.</i>						
16/3/98	100 0 0	Waikerikeri Creek	II.	Leaning Rock	..	Robert Hutton.
7/6/97	89 0 0	Ditto ..	I.	..	..	William Manghan.
9/6/97	68 0 0	Clutha River, Mutton Town	I., VII.	..	Matau Co. ..	Mata Dredging Co. (Ltd.).
28/2/98	50 0 0	Clutha River, above Clyde	III.	..	Monte Christo Co.	J. Nash and another.
7/6/97	92 0 0	Waikerikeri Creek	I., II.	..	..	Arthur H. Poole.
6/12/97	56 0 0	Clutha River, Clyde	I.	..	Unity Co. ..	P. Barnnan and others.
26/6/97	42 0 0	Ditto ..	I., II.	..	Victoria Co. ..	The Victoria Gold-dredging Co. (Ltd.).
6/12/97	45 0 0	..	I.	..	Vincent Co. ..	The Vincent Gold-dredging Co. (Ltd.).
<i>Black's.</i>						
28/2/98	100 0 0	Ida Valley ..	XII.	Tiger Hill ..	..	Thomas P. Beek.
8/3/98	22 0 0	Black's Hill ..	II.	..	Leslie H. Reynolds	L. H. Reynolds.
<i>Alexandra.</i>						
7/3/98	7 0 0	Manuherikia ..	XIX.	Tiger Hill ..	..	Peter Barr.
16/3/98	34 0 0	Clutha River, below Alexandra	I.	Fraser ..	..	J. Bruce.
18/1/97	50 0 0	Manuherikia River, Chatto Creek	VI.	Tiger Hill ..	Chatto Creek Co. ..	The Chatto Creek Dredging Co. (Ltd.).
13/11/95	58 0 0	Clutha River, Sandy Point	X., VII.	Leaning Rock	Chicago Co. ..	George Spencer.
18/6/96	42 0 0	Clutha River, Alexandra	VII., I.	Leaning Rock, Fraser	Clyde Dredging Co.	Clyde Dredging Co. (Ltd.).
8/2/98	6 0 0	Ditto ..	I.	Fraser ..	..	..
30/11/95	33 0 0	Sandy Hook, above Alexandra	X.	Leaning Rock	Earnsclough No. 1..	Charles Weaver.
6/11/96	93 0 0	Ditto ..	..	..	Earnsclough No. 2..	O. Weaver and another.
2/2/94	52 0 0	..	VII.	..	Enterprise Co. ..	Enterprise Gold-dredging Co. (Ltd.).
16/3/95	36 0 0	Clutha River, Alexandra	I.	..	Eureka ..	O. G. Leijon and others.
18/9/97	28 0 0	Ditto ..	..	Fraser ..	..	..
29/9/97	46 0 0	..	..	..	..	..
28/2/98	22 0 0	Clutha River, Fourteen-mile	III.	Cairnhill ..	Fourteen-mile Beach Co.	John Simes.
16/3/98	35 0 0	Manuherikia River, near Alexandra	VII.	Leaning Rock	Golden Link Co. ..	J. Ryan.
7/3/98	8 0 0	Poverty Beach	I.	Fraser ..	..	J. Hyde and others.
21/12/98	60 0 0	Clutha River, Mutton Town Point	VII.	Leaning Rock	Hyde and Party ..	John G. Hyde.
6/12/97	23 0 0	Clutha River, below Alexandra	II.	Fraser ..	Island Basin ..	D. Bringans and others.
16/3/98	26 0 0	Clutha River, Sixteen-mile	VIII.	Teviot ..	..	A. Kjoller.
18/9/97	100 0 0	Manuherikia River	IX., VIII.	Leaning Rock	Lion Rock Co. ..	Lion Rock Gold-dredging Co. (Ltd.).
28/2/98	36 0 0	Clutha River, below Alexandra	II.	Cairnhill ..	..	W. S. McCallum.
28/2/98	28 0 0	Ditto ..	II., XVII.	..	..	A. Magnus.
28/2/98	30 0 0	..	II.	..	..	J. Magnus.
16/7/97	99 0 0	Manorburn ..	IX.	Leaning Rock	Manorburn Co. ..	Manorburn Gold-dredging Co.
16/10/95	28 0 0	Clutha River, below Alexandra	I.	Fraser ..	Manuherikia Dredging Co. ..	O. Magnus and others.



**ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.**

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
------------------	-------	-----------	--------	------------------	----------------	---------------------------

*Alexandra—continued.*

18/9/97	99 0 0	Manuherikia River	VI.	Tiger Hill ..	..	John A. Millar.
11/10/98	40 0 0	Alexandra ..	XXI.	Town of Alexandra	Molyneux Hydraulic	Molyneux Hydraulic E. and G. Mining Co. (Ltd.).
19/8/97	26 0 0	..	XVI., VII.	Town of Alexandra, Leaning Rock	Molyneux Hydraulic Co.	Ditto.
1/10/96	69 0 0	Clutha River, above Alexandra	VII.	Leaning Rock	Ngapara Co. ..	R. Ross and others.
18/9/97	60 0 0	Manuherikia River	VI.	Tiger Hill ..	Nil Desperandum ..	L. Gard.
18/9/97	49 0 0	Ditto ..	IX., VII.	Leaning Rock	..	Charles H. Osmond.
18/9/97	100 0 0	..	VI.	Tiger Hill ..	..	A. J. Park.
20/4/96	18 0 0	Poverty Beach	I.	Fraser ..	Pattison and Party	J. Pattison and others.
18/11/96	38 0 0	Clutha River, near Sandy Point	X.	Leaning Rock	Perseverance ..	R. M. Findlay and others.
12/8/96	98 0 0	Ditto ..	..	..	..	..
18/9/97	100 0 0	Manuherikia River	IX., VIII.	..	..	Charles E. Richardson.
18/9/97	100 0 0	Ditto ..	{ VIII. V.	Tiger Hill }	..	..
6/12/97	21 0 0	Clutha River, below Alexandra	II.	Fraser ..	..	James Rivers.
7/6/97	48 0 0	Manorburn ..	IX.	Leaning Rock	..	William Ryan.
28/2/96	86 0 0	{ Manuherikia River and Flat	VIII. VI.	Tiger Hill }	..	John Tait.
18/9/97	80 0 0	Manuherikia River	IX.	Leaning Rock	Turakina Co. ..	Turakina Gold-dredging Co. (Ltd.).

*Roxburgh.*

16/8/92	20 0 0	Clutha River, above Roxburgh	I.	Teviot ..	Dunedin Gold-dredging Co.	Robert Brownlie.
1/8/92	45 0 0	Ditto ..	I.	..	Ditto ..	Thomas Brown.
24/4/96	41 0 0	Miller's Flat ..	II., III., VI.	Benger ..	Golden Run ..	Golden Run Dredging Co. (Ltd.).
14/8/93	52 0 0	..	III.	..	..	..
16/8/94	59 0 0	Clutha River, Ettrick ..	VIII.	..	Ettrick Co. ..	Ettrick Gold Steam-dredging Co. (Ltd.).
25/8/94	57 0 0	Clutha River, Miller's Flat	III., VI.	..	Pringle and Party ..	John Pringle and others.
16/8/96	62 0 0	Ditto ..	VI., III.	..	Golden Gate ..	Golden Gate Dredging Co. (Ltd.).
24/4/96	66 0 0	Ditto ..	III., VI., VII.	..	Golden Treasure ..	Golden Treasure Dredging Co. (Ltd.).
18/6/96	62 0 0	Horseshoe Bend	{ II. VII.	Benger Beaumont }	Golden Gate ..	Golden Gate Dredging Co. (Ltd.).
9/9/96	47 0 0	Ettrick ..	I., VI., XI.	Town of Ettrick	Bengerburn ..	Bengerburn Gold-dredging Co. (Ltd.).
18/2/97	47 0 0	Miller's Flat ..	III.	Benger ..	Otago Co. ..	Otago Gold-dredging Co. (Ltd.).
7/6/97	41 0 0	Roxburgh ..	I.	Teviot ..	Borland and another	John Borland and another.
7/6/97	62 0 0	Clutha River, Hercules Flat	VII.	..	Roxburgh Co. ..	Roxburgh Gold Steam Dredging Co. (Ltd.).
16/7/97	46 0 0	Clutha River, above Roxburgh	I.	..	Dunedin ..	Dunedin Gold-dredging Co.
18/9/97	100 0 0	Miller's Flat ..	VIII.	Benger ..	Laffey and Party ..	P. Laffey and others.
28/2/98	41 0 0	Clutha River ..	I.	Teviot ..	Pitchers and Party	Henry Youngman.

*Lawrence.*

18/9/89	170 2 85	..	{ XIV. IV. VII.	Tuapeka East Waipori .. T'wn of Waipori }	Upper Waipori ..	The Upper Waipori Alluvial-gold Dredging Co. (Ltd.).
8/10/94	185 2 0	..	XIV.	Tuapeka East	Jutland Flat ..	The Jutland Flat (Waipori) Gold-mining Co. (Ltd.).
24/8/96	40 8 0	..	{ VII. XV.	Beaumont Crookston }	..	William McLelland.
25/8/96	49 2 0	..	X.	Tuapeka East	Tuapeka Flat Dredging Co.	John Robinson and party.
9/12/98	44 0 0	..	IV.	Beaumont ..	..	Albert Boddington.
25/8/96	61 1 0	..	I.	Crookston ..	..	Edwin Pyrke.
9/12/95	87 2 0	..	..	..	..	Hugh Crossan.
18/7/96	99 2 0	..	V.	Waipori ..	..	Richard Pilling.
10/8/96	98 0 18	..	..	..	..	Archibald McKinlay.
10/8/96	80 1 20	..	III.	Tuapeka East	..	John Laffey.
30/11/96	76 8 0	..	XXI., XVIII.	Crookston ..	..	William C. McGregor.
30/11/96	40 2 0	..	{ XIV. XV.	Beaumont Crookston }	..	John E. McClelland.
15/2/97	14 2 24	..	I.	Waitahuna W.	..	Robert McLeod and others.
15/2/97	26 1 0	..	III.	Tuapeka West	..	John Laffey.
29/8/97	27 8 13	Weatherstone's	XIX.	Tuapeka East	Robertson and Party	James W. Robertson.
29/8/97	84 2 38	Waipori ..	V.	Waipori	Success ..	Success Gold-dredging Co. (Ltd.).
29/8/97	72 0 0	Beaumont ..	VII.	Beaumont ..	Golden Lead ..	Golden Lead Gold-dredging Co. (Ltd.).



## ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—continued.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
<i>Lawrence—continued.</i>						
29/3/97	A. 96 0 15	..	IV.	Waipori ..	Excelsior.. ..	John Lawson.
29/3/97	R. 28 1 35	Waipori ..	..	..	..	..
7/6/97	P. 78 2 18	..	{ X. XXXIV.	Waitahuna E. Town of Have-look	Waitahuna Dredging Co.	Roger Kirby and party.
3/8/97	48 2 34	Tuapeka Flat..	VI.	Tuapeka West	Tuapeka ..	Tuapeka Dredging Co. (Ltd.).
3/8/97	58 3 19	Beaumont ..	XV.	Crookston ..	Bennet and Party..	Charles Bennet.
3/8/97	28 0 6	Waitahuna ..	XXXIV.	Town of Have-look	..	Robert McKenzie.
12/11/97	34 0 13	Tuapeka Flat..	XX.	Tuapeka East	Record Reign ..	William Murray.
17/3/98	98 3 18	Waipori ..	IV., V.	Waipori ..	McNeil and Party..	James McNeil.
4/3/98	25 3 28	Tuapeka Flat..	{ VI. IV.	Tuapeka W. } Tuapeka E.	Fitzgerald and Party	Cornelius Fitzgerald.
11/1/98	7 1 0	Glenore ..	III.	Table Hill ..	Nil Desperandum ..	Arnold Sturm.
<i>Waikaka.</i>						
23/12/98	44 1 24	..	XIV.	Chatton ..	Waikaka Dredging Claim	John R. Perry.
8/12/97	100 0 0	..	I.	Waikaka ..	Winding Creek ..	Winding Creek Dredging Co.
8/12/97	96 3 0	..	I., II.	Wendon ..	Mystery Flat Dredging Claim	G. M. Grigg.

*Naseby.*

The Naseby Dredging and Hydraulic-sluicing Company's Dredge is at work in this district, and is reported to be yielding good returns. The length of the dredge is 70 ft., with 25 ft. beam. The ladder is 45 ft. in length, the capacity of the buckets being  $3\frac{1}{4}$  cubic feet. Engine and boiler, 20-horse power nominal and 38-horse power actual.

Another dredge is at work on the upper Kyeburn, but it is not of the most modern type.

At Macrae's Flat contracts have been let for the construction of two dredges of approved type and large capacity.

*Black's.*—It is intended to work several special claims in this locality by means of dredging, and an up-to-date dredge is now being built.

*St. Bathian's.*—The Cambrian dredge, which is of the most up-to-date description, is approaching completion, and will shortly be at work.

*Waikaka.*

The dredges owned and worked by Mr. J. R. Perry and Messrs. William McGill and party in this district are, I hear, on payable gold. In this district mining matters are brightening. Several special claims have been granted, and a number of applications are pending.

*Perry's Dredge.*—This dredge is situated on a flat, within half a mile of Waikaka Township, and in a line between the township and the cemetery. The claim, which consists of an area of 44 acres, is held under a license, dated 23rd December, 1896. About 6 acres of the land has already been worked during the year. The depth of the portion worked is about 13 ft. The top layer consists of soil about 1 ft. in thickness, under which the clay varies from 2 ft. to 9 ft. This is succeeded by a layer of gravel, containing the gold. The wash which yields the most gold is of fine description, and lies on a gravel bed, which does not contain gold, probably the "Maori bottom." The dimensions of the dredge are 70 ft. by 24 ft., and the well for the ladder is 30 ft. in length, the buckets having a capacity of  $2\frac{1}{4}$  cubic feet. The length of the ladder is 40 ft. The tables are 40 ft. by 3 ft., partly perforated plates and partly iron riffles, with cocoanut-matting underneath. There are also three tables on each side; these are 5 ft. by 3 ft., and covered with matting. The washed gravel is discharged from a lander attached to the tables, the shallow depth worked rendering the use of an elevator for the tailings unnecessary. A paddock was first excavated to hold water sufficient to float the dredge, and a small stream of water is found sufficient to keep up a supply necessary for the dredge to float in and to prevent the water from becoming too muddy for working purposes. This is an instance of dredging being carried on successfully in a wet flat where no great quantity of water is to be found on the surface. Six men are employed, and operations are conducted by Mr. John M. Walker, the manager. The returns of gold are from 11 oz. to 12 oz. per week.

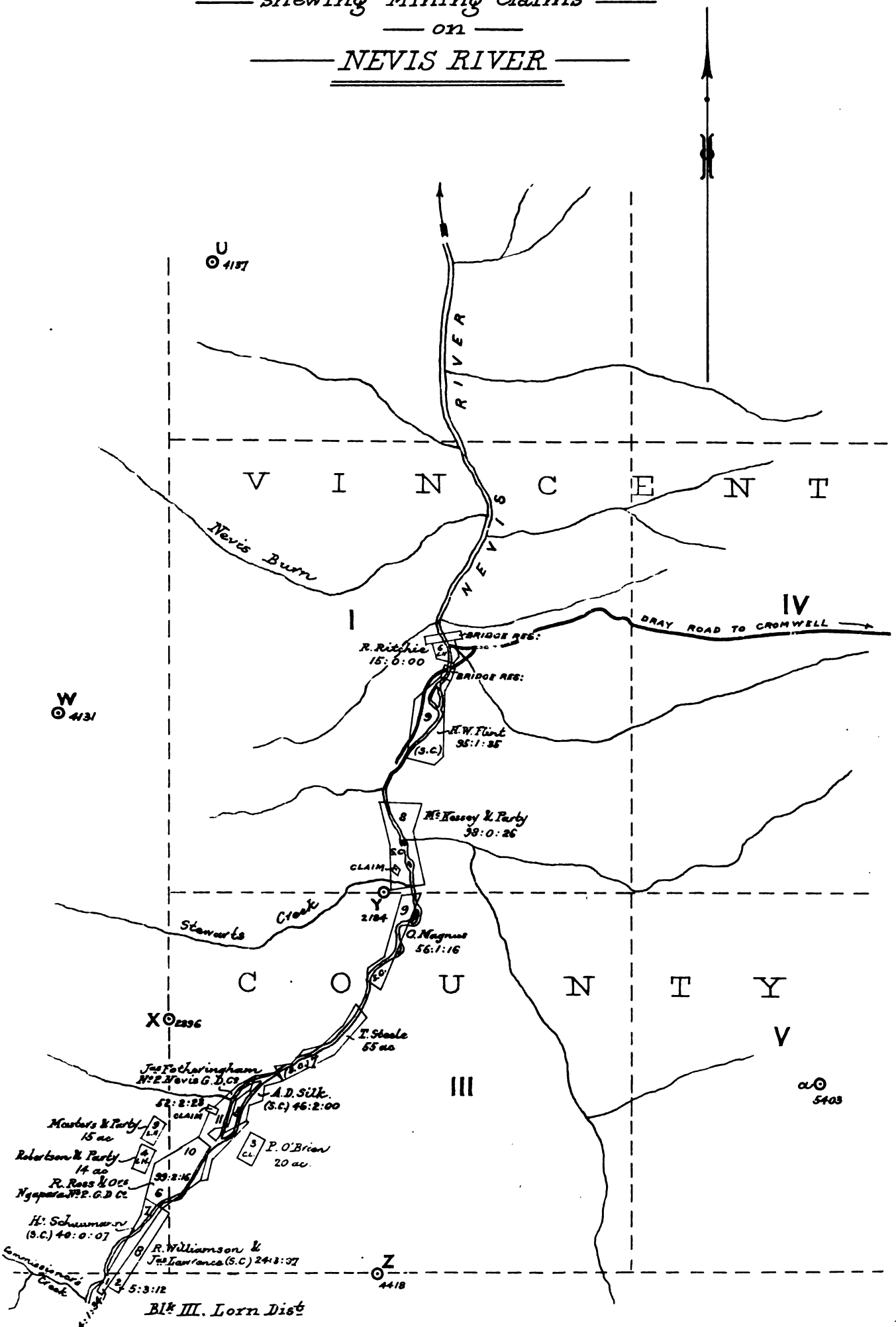
McGill's dredge is situated on the left branch of the Waikaka, and is owned and worked by a party of six men. The dredge is built on somewhat similar lines to Perry's dredge, and the wash is of a more gravelly nature, there being less clay than is found in the first-named claim. Mr. W. McGill informed me that the returns were, on the whole, satisfactory, being somewhat better than what is obtained by Mr. Perry.

*The Golden Crown Dredging Company.*—This company have started dredging on the Waikaka River, but up to the present time have been unable to show satisfactory results. The dredge cost £3,500.

*Shotover.*

The Golden Terrace No. 1 and No. 2 dredges, which formerly belonged to the Sew Hoy Big Beach Dredging Company, are working in that part of the river where the current is very rapid. Nine men are employed on each dredge.

— Sketch Plan —  
 — shewing Mining Claims —  
 — on —  
NEVIS RIVER



— Scale 80 Chains = 1 inch. —  
 C. H. P. del.



二

一

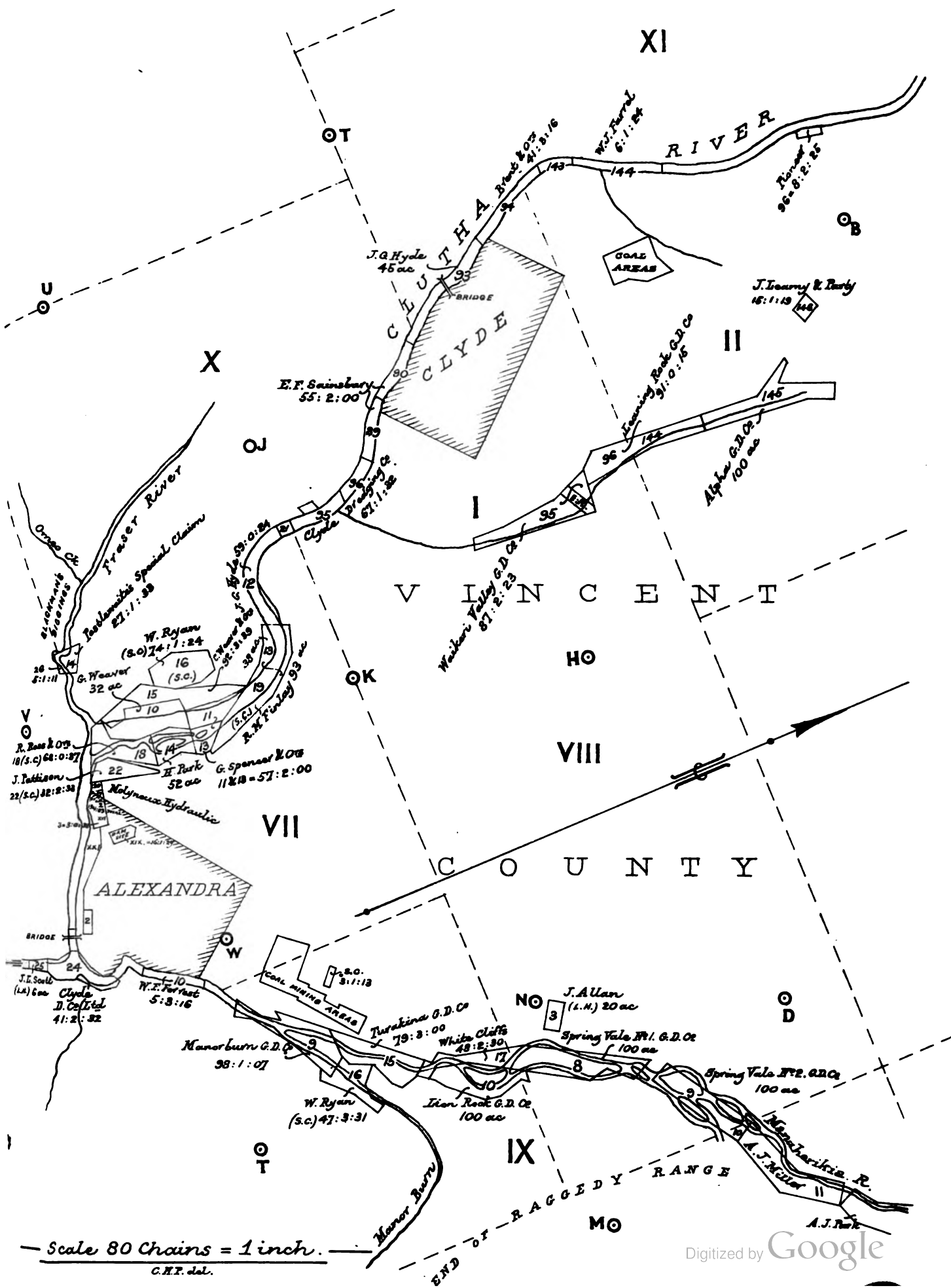
一

十

三



— Sketch Plan —  
 — shewing Mining Claims —  
 — on the —  
CLUTHA & MANUHERIKIA RIVERS.

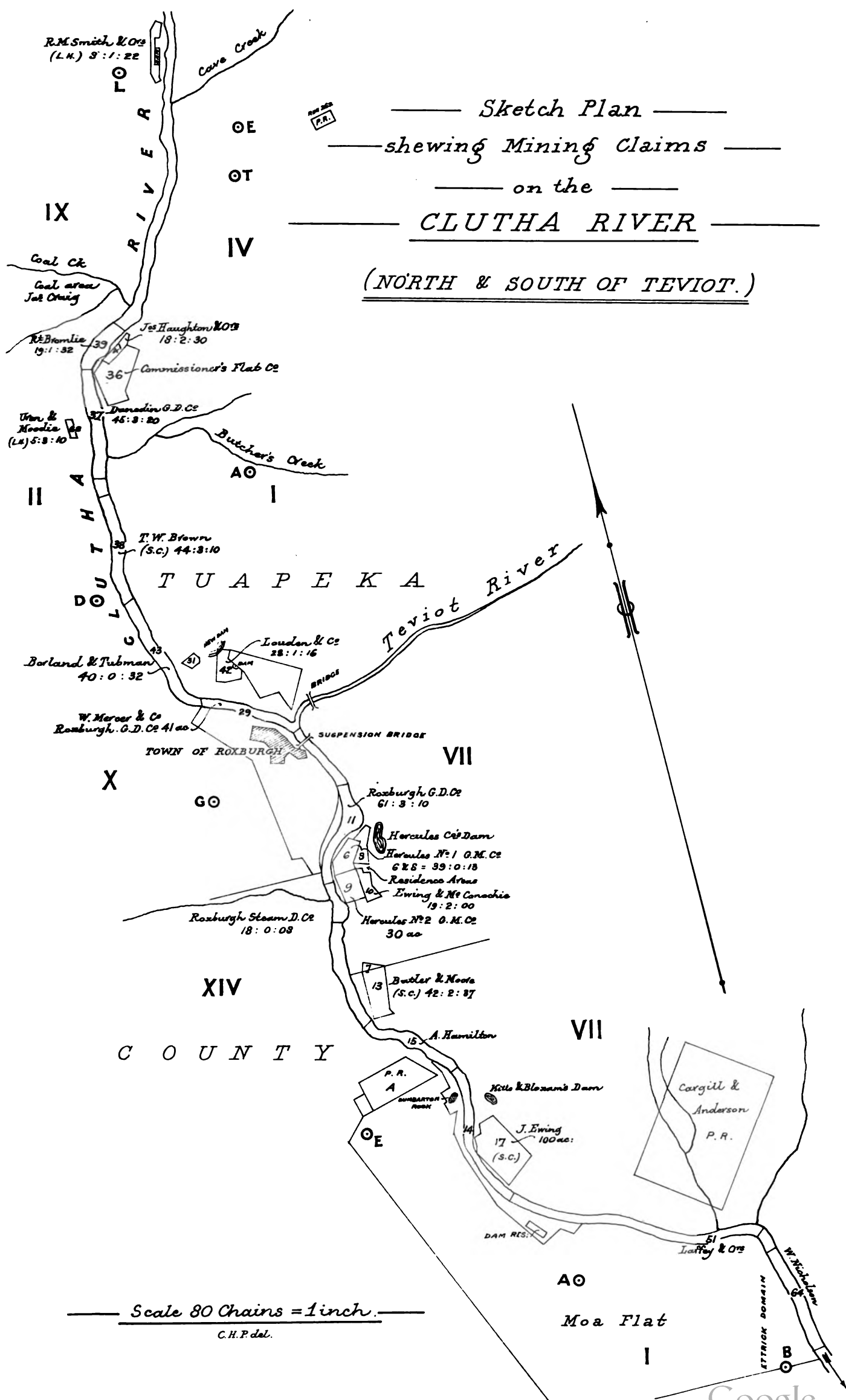




[illegible]



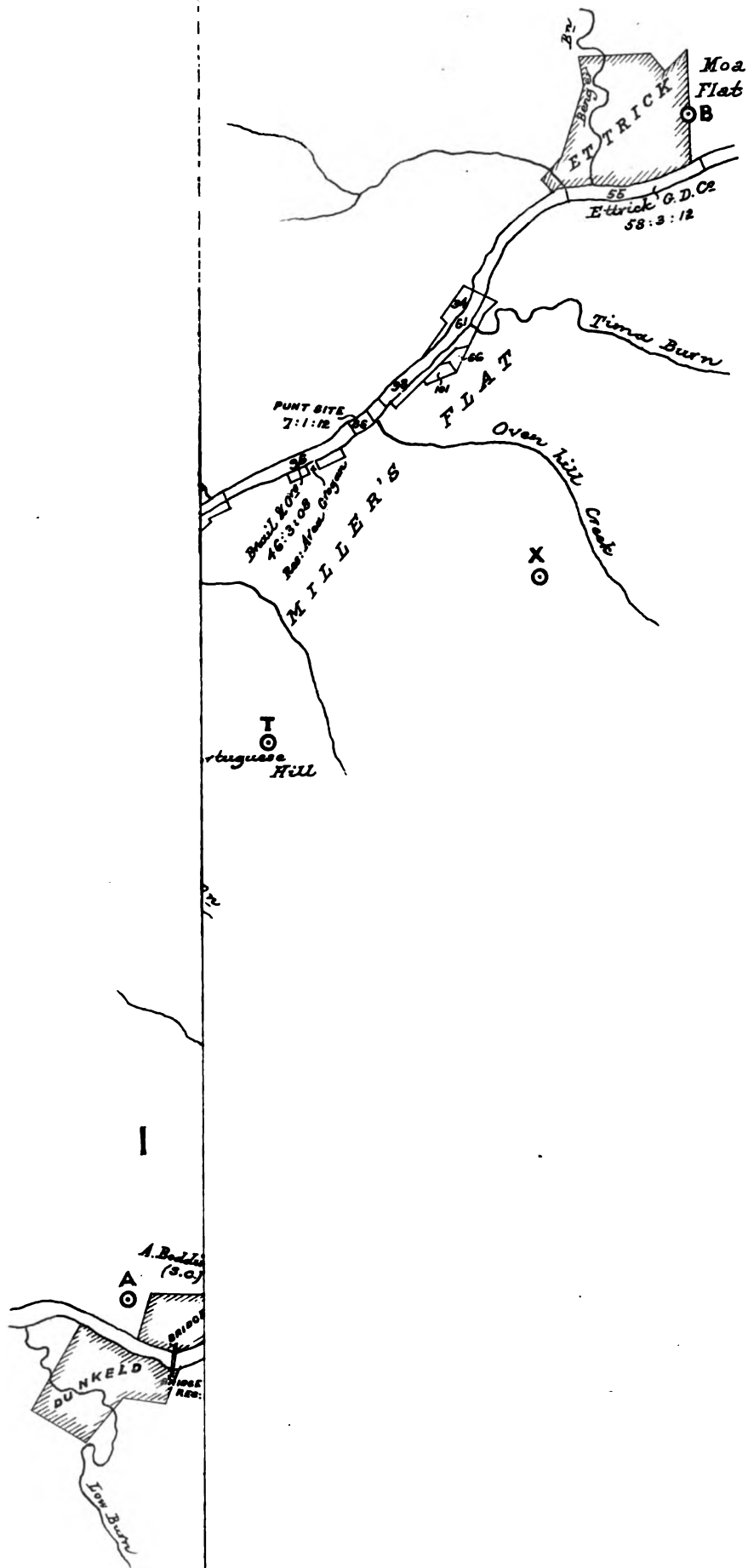




Sketch Plan  
shewing Mining Claims  
on the  
CLUTHA RIVER  
(NORTH & SOUTH OF TEVIOT.)

Scale 80 Chains = 1 inch.  
C.H.P. del.







*Waipori.*

*Success Gold-dredging Company (Limited).*—This company took over a special claim of 84 acres from W. Hanley, and built a dredge at a cost of £2,900. It has been working since January last, and the directors are well satisfied with the results so far.

*Empire Gold-dredging Company (Limited).*—This company took over the special claims of Messrs. McKinlay and Pilling. The claim is situated on the Waipori Flat. The dredge is now being built, and will be equipped with all the latest appliances by Messrs. Morgan and Cable, of Port Chalmers. The company expects to make a start dredging about the month of June.

*Messrs. McNeil and Party.*—The returns of this company are not published, it being a private company, but from what I can hear the returns are exceedingly good.

*Jutland Flat (Waipori) Gold-mining Company (Limited).*—This company has been working steadily during the year, and has won 1,151 oz. of gold for the twelve months, and has paid dividends amounting to £1,875.

*Upper Waipori Alluvial Gold-dredging Company (Limited).*—This company has also been working for the greater part of the year. The yield of gold was 1,169 oz. Dividends declared amount to £600 for the year.

*Perseverance Dredge.*—Messrs. McNeil and company have been at work with this dredge for the past thirteen months, with fair results. The dredge is working in practically dead-water.

*New Sandhills Dredge.*—Operations have been continued during the year in this dredge, which is situated on the Upper Shotover, about seven miles above Skipper's Point. The returns are said to be satisfactory.

*Island Block.*

The Golden Lead Company's dredge is to be moved up opposite Craig's paddock.

The Golden Gate dredge is working in the river, below Island Block.

The Golden Run Company is about to construct a new and improved dredge for working at the head of Island Block.

*Miller's Flat.*

The Otago Company's and Golden Gate Company's dredges have both done very well dredging from the bed of the Molyneux.

The Golden Treasure dredge has done very well near Kerr's Creek, the returns in dividends to the shareholders having been very large. This dredge is working the river-bed.

Pringle's dredge is working on the Molyneux River, about nine miles below Miller's Flat Ferry.

*Roxburgh.*

The Bengerburn dredge is now working on tribute at the mouth of the Benger Creek.

The Ettrick dredge has been working profitably in the river near Ettrick Township during the year.

The Edina dredge has been prospecting the river above Roxburgh, but frequent stoppages have been occasioned by breakdown in the machinery. The owners, having purchased the Roxburgh Gold Steam-dredging Company's dredge, are now prospecting Mr. Youngman's claim, opposite Roxburgh.

The Dunedin dredge is working in the Molyneux River, near Coal Creek Flat. Eight men are employed.

The Roxburgh Dredging Company has gone into liquidation, but the dredge is now working in the river with fairly satisfactory results.

*Alexandra.*

The prospects of the dredging industry have never been so good as at present. Thirteen dredges are working within four miles on the Clutha River, and another three on the Manuherikia, an additional five being now under construction on the Clutha, and three on the Manuherikia.

The Manuherikia Gold-dredging Company's dredge has been working in midstream on the Molyneux River, just below the mouth of the Manuherika, but is now laid up for repairs.

The Molyneux Hydraulic Company's dredge is perhaps the most efficient at present working on the Clutha River, and it is gratifying to find that the returns have paid the cost of the construction of the dredge, and dividends will shortly be paid to the shareholders.

The Enterprise Company's dredge has been working now four years and a half on the claim opposite Sandy Point. The returns during the past year have been very satisfactory, dividends to the extent of £1,250 having been declared.

The Moa dredge, at Frenchman's Point, did exceptionally well, the return for one week being 288 oz.

The Eureka No. 1 (Leijon and party) and Ngapara (Ross and others) dredges have been at steady work, and have apparently done well.

The Eureka No. 2 dredge (Leijon and party) is working near the side of the river, and is of a modern description. Seven men are employed.

The Clyde dredge (Dr. J. C. Hyde and Co.) is working on the bank of the Molyneux River, away from the current. Six men are employed on this dredge.

The Chicago and Earnsclough No. 1 dredges, both working at Sandy Point, have done remarkably well.

The Perseverance No. 1 Gold-dredging Company is working with three men in the bed of the river.

The Perseverance No. 2 Gold-dredging Company's dredge has been at work for some time in the bank of the river, away from the current, but is now laid up for repairs.

*Manorburn Dredging Company (Limited).*—The Victoria dredge is at present undergoing repairs at Alexandra, prior to being taken further down the river. The whole of the Manuherikia River and adjoining low flats from Alexandra, to the mouth of Chatto Creek, has been taken up, and it is believed that the flats will return satisfactory yields for work done.

The Manorburn dredge, which is working near the mouth of the Manorburn Creek, although of an old-fashioned type, has done very well.

The Turakina dredge and those on the adjoining claims have done excellent work. In the case of the first named a dividend has been declared to the company's shareholders, the first paid by any dredge on the Manuherikia River.

The Lion Rock dredge is now at work on the adjacent claim, with very favourable prospects.

*Cromwell.*

A great amount of success has not attended dredging on the Upper Clutha River.

Talboy's dredge has ceased operations.

Crookston's dredge is being removed to below the Cromwell Bridge, where it will be engaged on McPherson's claims.

Hotop's is the only dredge on the river above the Cromwell Bridge, but Hartley and Riley Beach Company's dredge is ready for machinery.

On the Kawarua the Electric No. 3 dredge is nearly completed, and the company's Nos. 1 and 2 dredges are doing very well on their claims.

The Current Wheel dredge, which is owned by Bryce, Kloogh, and Talboys, is working in the stream, but the returns have not been very satisfactory.

McLay's dredge, working in the Clutha River at Lowburn, has six men employed, but no returns have been published.

*Nevis.*

Four dredges have been at work in this district, a like number being in course of construction. All the dredges at work have done fairly well.

The Upper Nevis Company's dredge is now on their claim below the township.

The pontoons for Allen and Aitken's dredge are launched, and the machinery will shortly be in position.

*Tuapeka.*

William Murray and party, in a special claim near Chinese Camp, have done fairly well, and are said to be satisfied with the undertaking. This dredge is lighted with electric light.

J. Harris and party, known as the Tuapeka Flat Dredging Company, stopped work for a great part of the year owing to the delay in getting a new boiler out from England.

James Henley and party have only just started. The locality was a rich one in the early days, and it is very probable that it will give satisfactory returns.

The Evan's Flat Dredging Company and the Tuapeka Dredging Company are each constructing a dredge. It is expected that the latter will be in working-order about the end of May, and the former by about the month of June. These dredges are being fitted up with all the latest appliances, and lighted with electric light.

Three other special claims have been taken up on the Tuapeka River, below the above-mentioned, with the object of putting dredges on.

*Weatherstone's.*

J. W. Robertson's dredge has not been working satisfactorily.

*Tuapeka Mouth.*

Messrs. Henley and party's dredge was formerly working at the mouth of the Tuapeka River on Watts Goodwin's claim, but, owing to the difficulty in working the ground, was removed to Tuapeka Flat, and is now worked by the above party.

Messrs. McLeod and party's dredge has been brought down the river for the purpose of working the above party's claim at the mouth of the Tuapeka River. The returns are considered satisfactory.

*Waitahuna.*

The Waitahuna dredge, now owned by McKenzie and party, still continues to work on the river-flat below the township. The average returns are about equal to the previous year.

*Glenore.*

John Nelson and party have been working continuously during the year with good results, and about £400 has been spent in replacing the old boiler.

Tullock and party have been working steadily during the year, and are on payable gold.

Messrs. Robertson and party have built a new dredge during the year. It has been working for about one month on the river below the township, and is reported to be doing well.

*Tapannui.*

On the Pomahaka River only one dredge is now at work, and the owner reports doing fairly well.

In addition to the foregoing, a number of dredges are in course of construction throughout Otago.

*Accidents in Dredging.*

Five fatal accidents happened during the year—viz., Robert Falconer was drowned off McLeay's dredge, Lowburn, on the 3rd June, 1897; James Drysdale was drowned off the Roxburgh dredge on the 24th June, 1897; — Downing was drowned by falling off a plank on a dredge at Nevis on the 10th December, 1897; — Johnston was drowned by the capsizing of a boat at the Earnsclough dredge, at Alexandra, on the 17th December, 1897; and Peter Stenhouse was killed by machinery on board the Golden Terrace dredge, at Queenstown, on the 26th January, 1898.

The estimated number of men employed about dredges is 420. The proportion of fatalities is thus 11·9 per thousand, which is very much greater than the ordinary average of mining accidents.

*Some Yields from Dredging.*

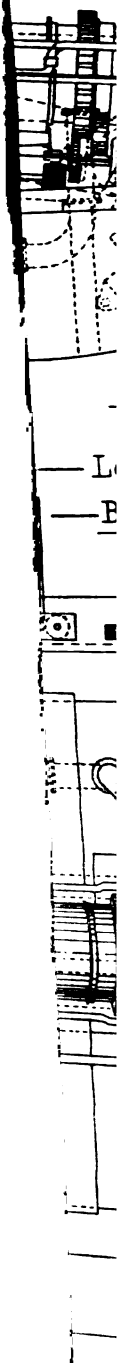
It is at present impossible to obtain complete returns of the gold won by dredging operations. The owners in many instances do not desire their yield of gold to be published; therefore the following list gives only some of the results which the owners have furnished for public information. The totals show that 10,909 oz. 4 dwt. of gold were recovered in this way:—

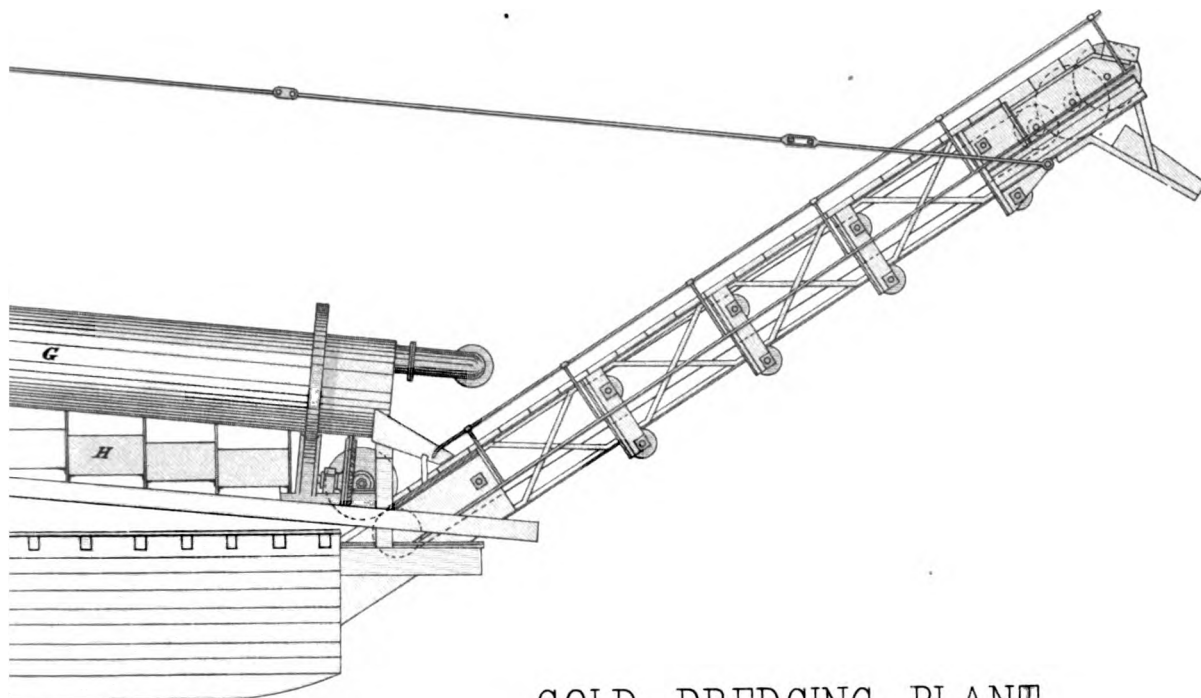
Some of the OTAGO DREDGING RETURNS for Year ending 31st March, 1898.

Name of Company or Dredge.	Locality of Operations.	Yield of Gold												Total Yield of Gold.			
		1897.											1898.				
		April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.				
Golden Terrace	..	Shotover	..	..	Oz. dwt. gr. .. ..	Oz. dwt. gr. .. ..	Oz. dwt. gr. .. ..	Oz. dwt. gr. .. ..	Oz. dwt. gr. .. ..	Oz. dwt. gr. 44 19 6	Oz. dwt. gr. 109 7 0	Oz. dwt. gr. 27 13 6	Oz. dwt. gr. 35 5 8	Oz. dwt. gr. 217 4 20			
Otago	..	Miller's Flat	..	..	48 5 0	26 0 0	53 0 0	121 5 0	96 0 0	..	38 10 0	105 11 0	86 7 0	140 14 0	100 12 0	100 15 0	916 7 0
Golden Treasure	..	"	..	..	38 5 0	44 10 0	117 10 0	244 0 0	218 10 0	91 5 0	85 14 0	64 13 0	27 0 0	85 10 0	59 10 0	45 10 0	1,071 17 0
Golden Gate	..	"	..	..	28 0 0	13 5 0	53 0 0	49 0 0	66 10 0	240 0 0	130 8 0	29 13 0	21 13 0	28 19 0	69 11 0	83 18 0	803 17 0
Clyde..	..	Alexandra	..	..	82 10 0	20 10 0	368 10 0	428 0 0	745 0 0	342 0 0	125 0 0	..	..	..	86 0 0	27 0 0	2,224 10 0
Enterprise	..	"	..	..	26 10 0	64 10 0	46 5 0	59 10 0	106 5 0	89 15 0	110 10 1	88 4 9	77 0 13	71 6 3	127 3 13	66 8 14	938 8 5
Jutland Flat	..	Waipori	..	..	70 5 0	89 10 0	78 0 0	129 10 0	20 15 0	110 0 0	70 11 0	108 10 0	155 3 21	43 8 0	90 6 0	57 6 0	1,023 4 21
Upper Waipori	..	"	..	..	150 5 0	165 0 0	133 0 0	124 5 0	157 0 0	99 5 0	36 19 0	38 14 0	99 12 0	64 2 0	62 10 0	14 15 0	1,145 7 0
Ettrick	..	Ettrick	..	..	46 10 0	65 10 0	70 0 0	89 15 0	93 10 0	61 0 0	30 10 0	18 9 0	24 18 0	39 18 0	37 10 0	17 1 12	594 11 12
Dunedin	..	Roxburgh	..	..	24 10 0	8 15 0	80 0 0	148 5 0	164 0 0	31 0 0	4 0 0	..	..	..	..	61 10 0	522 0 0
Kyeburn	..	Kyeburn	..	..	..	..	..	..	..	..	..	..	..	..	..	14 12 12	14 12 12
Molynaux	..	Alexandra	..	..	..	..	39 0 0	..	..	..	..	..	..	88 0 11	121 1 8	248 1 19	
Edina	..	..	..	..	..	..	7 0 0	..	10 0 0	..	..	..	..	..	21 5 13	..	38 5 13
Golden Run	..	Miller's Flat	..	..	..	..	63 0 0	..	100 0 0	177 0 0	163 0 0	..	33 0 0	21 0 0	..	..	557 0 0
Success	..	..	..	..	..	..	..	..	..	..	..	..	..	14 12 0	..	..	14 12 0
Golden Crown	..	Waikaia	..	..	..	..	..	..	..	..	8 15 0	27 10 0	..	..	..	..	36 5 0
Roxburgh	..	Roxburgh	..	..	25 0 0	57 5 0	19 10 0	24 0 0	64 0 0	62 15 0	..	..	..	..	..	..	252 10 0
Saw Hoy Big Beach	..	Shotover	..	..	77 0 0	56 0 0	..	31 10 0	100 15 0	30 5 0	..	..	..	..	..	..	295 10 0
														10,909 4 6			

The returns for the Electric dredge, from which very rich yields were obtained, as well as those from thirty-nine other dredges, are not included in this return.



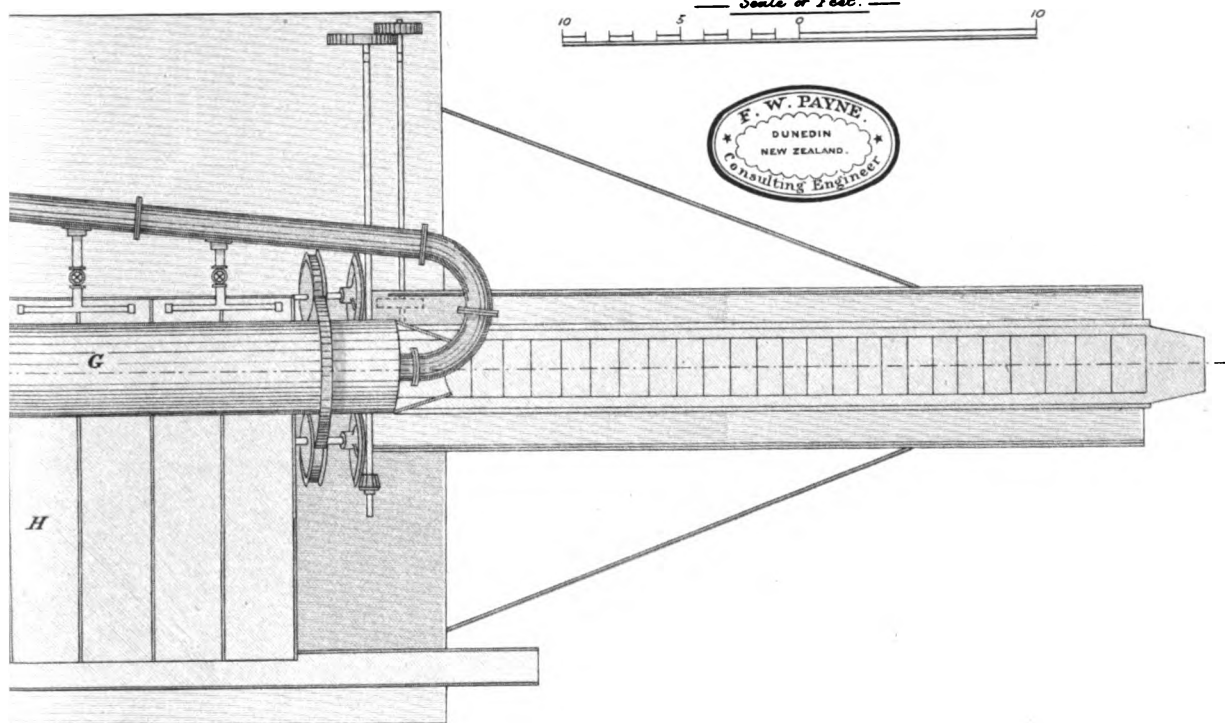




— GOLD-DREDGING PLANT —

— Length of Dredge 109 feet . Beam 25 feet 6 inches. —

— Bucket Ladder 75' long. Capacity of Buckets  $5\frac{1}{2}$  c.ft. —





AUCKLAND DISTRICT.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Shares held by holders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shares held by present.	Number of Men employed.	Oz.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
												Quantity.	Value.		
Queen Victoria of Hauraki	2 Sept., 1896	£ 8,500	£ ..	£ ..	85,000	£ s. d.	£ s. d.		97	2	..	£ 998	..	£ ..	..
Te Puke .. ..	8 Nov., 1897	2,045	213	30,000	81,800	0 0 1	2 10 0	1,200	108	8	..	206	..	206	..
City of Gisborne	11 Sept., 1896	6,000	1,674	..	80,000	0 0 2½	84 6 10	89,125	95	..	..	1,660	..	1,660	..
Balfour .. ..	1895	10,500	1,400	..	70,000	0 0 9	..	..	136	..	..	1,208	..	1,208	..
Alburnia East ..	17 Sept., 1895	8,250	2,409	..	55,000	0 0 6	490 11 9	28,232	53	5	14	2,383	..	2,383	..
Alpha .. ..	30 Mar., 1895	7,500	971	187	50,000	0 0 6	..	..	142	11	26	2,598	..	2,598	..
Tamihana .. ..	1896	10,000	800	..	50,000	0 0 8	..	..	54	..	..	688	..	688	..
Imperial .. ..	22 Feb., 1895	10,000	3,416	416	100,000	0 0 5	..	348	283	9	2	4,237	..	4,237	..
Wealth of Nations	13 Mar., 1895	12,000	1,942	..	60,000	0 0 4	..	27,047	82	..	8	1,949	..	1,949	..
Exchange .. ..	23 July, 1896	2,500	951	..	50,000	0 0 4½	..	25,194	16	..	..	944	..	944	..
British Empire (in Liquidation) ..	12 Oct., 1895	9,000	2,145	..	60,000	0 0 4½	..	26,050	70	..	..	2,146	..	2,146	..
Coromandel Freehold Proprietary ..	11 Nov., 1895	18,750	10,000	..	150,000	0 0 28	..	14,888	199	..	..	10,768	..	10,768	..
Omega .. ..	29 Oct., 1896	5,000	1,579	..	100,000	0 0 2	..	..	28	..	..	1,542	..	1,542	..
Rainbow (in Liquidation)	3 Sept., 1896	2,000	264	..	20,000	0 0 2	..	34,180	34	..	..	466	..	466	..
Waipuru .. ..	21 Aug., 1896	3,750	508	..	50,000	0 0 2	..	..	26	..	..	864	..	864	..
Queen of Beauty .. ..	24 Oct., 1896	10,000	960	..	100,000	0 2 6	..	..	22	2	767	9,672	..	9,672	..
Orunond .. ..	8 June, 1897	5,200	660	..	52,000	0 0 4	247 5 10	670	286	15	381	2,414	..	2,414	..
Welcome Find (Limited)	18 April, 1895	17,500	7,798	1,000	70,000	0 0 9½	..	21,550	313	7	40	108	..	108	..
Nonpareil .. ..	27 Aug., 1896	6,000	1,502	1,864	60,000	0 0 1½	..	14,588	151	..	..	5,208	..	5,208	..
New Whau .. ..	30 Mar., 1895	18,750	3,625	..	125,000	0 0 8	..	75,175	20	..	..	5,595	..	5,595	..
Waitea .. ..	29 Oct., 1896	4,500	905	50	90,000	0 0 1	224 15 7	..	98	..	..	1,578	..	1,578	..
Waihi Consols ..	18 Oct., 1895	16,200	5,463	..	162,000	0 0 1	..	..	77	..	..	3,060	..	3,060	..
Hauraki No. 2 ..	10 July, 1895	12,000	6,625	..	80,000	0 0 1	131 10 7	89,038	39	17	367	785	..	785	..
Express .. ..	5 Nov., 1896	18,000	1,280	..	90,000	0 0 1	925 0 0	..	307	5	2	1	..	1	..
Jupiter .. ..	12 Oct., 1895	10,000	5,019	..	40,000	0 0 3	..	375	178	6	..	1,997	..	1,997	..
Adelaide .. ..	1 Nov., 1895	15,000	1,019	..	60,000	0 0 3	..	25,588	44	..	..	1,034	..	1,034	..
Barrier Reefs (Limited)	23 May, 1897	100,000	3,075	80,000	100,000	0 4 0	..	..	305	4	..	2,617	..	2,617	..
Ivanhoe .. ..	30 Mar., 1895	12,000	2,896	291	120,000	0 0 6	..	..	231	3	..	2,008	..	2,008	..
Albert .. ..	9 July, 1896	12,000	2,295	..	80,000	0 0 8	..	..	58	3	..	1,891	..	1,891	..
Renown .. ..	18 Nov., 1896	12,000	1,043	..	60,000	0 0 1	162 5 11	..	9	..	..	1,401	..	1,401	..
Talman Extended (Limited)	29 July, 1895	17,700	2,164	..	129,888	0 0 4	..	..	8	..	..	686	..	686	..
Broken Hill (Limited)	16 Jan., 1895	13,500	1,966	..	90,000	0 0 4	3 2 9	..	201	6	1	1,315	..	1,315	..
Comstock (Limited)	30 Jan., 1895	15,000	1,269	..	100,000	0 0 8½	188 6 10	..	48	8	..	880	..	880	..
Waihi Reefs .. ..	7 May, 1896	9,000	1,408	..	45,000	..	119 0 2	10,400	24	..	..	508	..	508	..
Waihi Beach .. ..	28 Dec., 1897	6,500	455	..	180,000	1 5 0	..	..	118	..	9	797	..	797	..
Kennedy's Bay Township and Gold-mining (Limited)	11 Aug., 1896	2,000	552	250	200	..	185 10 0	..	8	..	..	954	..	954	..
New Golden Point	31 April, 1897	10,000	1,835	..	100,000	..	308 9 0	16,166	201	6	..	2,253	..	2,253	..
Owharoa United	23 Aug., 1896	9,000	880	..	60,000	..	58 19 10	..	48	8	..	245	..	245	..
Dawn of Hope ..	3 Oct., 1896	6,000	705	..	60,000	..	48 11 8	..	22	..	..	708	..	708	..
Flemington (Limited)	1 Oct., 1896	5,000	792	..	50,000	..	..	..	85	4	..	989	..	989	..
Criterion .. ..	31 July, 1896	10,100	998	..	101,000	..	..	8,104	132	..	..	1,852	..	1,852	..
Egerton .. ..	10 Aug., 1897	8,750	187	..	75,000	0 0 0½	..	..	87	..	..	464	..	464	..
Day Dawn .. ..	6 Sept., 1895	13,000	95	1,000	60,000	0 0 6	34 3 4	9,060	23	2	..	2,119	..	2,119	..
Inland Reefs ..	14 May, 1897	4,600	251	1,000	77,000	0 0 6	187 1 8	89,800	132	..	..	..	..	..	..
Nellie .. ..	23 Oct., 1896	6,000	750	..	70,000	..	..	..	85	..	..	..	..	..	..
Mount Waihi ..	26 Sept., 1895	24,000	62	..	120,000	..	..	62,115	183	..	..	..	..	..	..
Sunlight .. ..	9 Dec., 1896	16,000	1,096	..	112,700	..	..	..	238	4	..	..	..	..	..
Waiteauri No. 2	11 Sept., 1895	15,905	416	..	50,000	..	187 16 6	90,156	238	..	..	..	..	..	..
Royal (Limited)	21 Mar., 1895	12,500	1,270	..	150,000	..	..	..	..	..	..	..	..	..	..
Waiteauri South ..	4 Sept., 1895	30,000	1,270	..	150,000	..	..	..	..	..	..	..	..	..	..

## STATEMENT OF AFFAIRS OF MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—continued.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT—continued.														
Karangahake ..	24 Oct., 1895	12,000	£ 416	£ ..	60,000	£ s. d.	£ s. d.	19,839	101	2	Oz.	£	1,807	£
Big Reef ..	2 Sept., 1896	6,000	688	..	120,000	..	66 18 5	64,004	58	..	..	..	1,039	..
Tairua Proprietary ..	28 July, 1896	28,112	..	..	92,450	..	..	..	124	..	..	..	1,228	..
Hauraki South (Limited) ..	11 June, 1896	..	..	..	..	..	..	..	..	16	..	28	4,517	..
Tentonic ..	26 Sept., 1895	10,200	566	..	68,000	..	..	150	52	2	..	..	1,888	..
City of Auckland ..	7 Aug., 1896	18,750	908	..	75,000	..	..	7,000	100	6	..	3	2,168	..
Progress Castle Rock ..	19 Sept., 1895	9,750	1,402	..	65,000	..	86 18 10	41,782	163	4	..	171	2,198	..
Kuranui (Limited) ..	12 Sept., 1895	15,000	1,250	..	60,000	..	..	..	43	4*	..	4	1,902	..
Rising Sun ..	16 Oct., 1895	18,000	..	600	130,000	0 0 7½	..	..	198	5	..	..	1,825	..
Puru Junction ..	6 Oct., 1896	9,800	650	4,250	98,000	0 1 0½	107 3 9	51,450	70	3	..	..	685	..
Ohinemuri ..	6 Aug., 1896	8,000	1,200	1,200	80,000	0 0 7½	..	..	198	8	..	..	856	..
Sceptre ..	11 Feb., 1897	3,750	664	1,250	74,577	0 0 3½	..	..	88	..	..	..	672	..
British Gold and Silver ..	17 Jan., 1896	9,750	4,149	3,500	35,000	0 2 6	485 13 10	33,300	17	..	..	9	4,127	..
Puru Consolidated (Limited) ..	17 July, 1897	22,897	..	7,878	61,060	0 0 7½	..	..	138	16	..	4	621	..
Temple Bar ..	2 Oct., 1896	3,250	998	..	65,000	0 0 7½	130 3 10	32,224	61	2	..	..	975	..
Alpine Fluke ..	25 June, 1896	7,000	1,050	..	70,000	..	..	..	96	2	..	..	1,011	..
Vulcan ..	31 Oct., 1896	3,225	368	8,750	64,500	10 0 3	..	..	41	..	..	..	351	..
Waitekauri King ..	26 Feb., 1896	11,545	2,906	..	117,450	0 0 3½	..	19,394	163	4	..	9	2,241	..
Wentworth ..	23 Nov., 1896	2,825	925	..	56,500	..	..	10,550	47	10	..	..	853	..
Star of Tairua ..	30 Mar., 1897	400	400	..	72,500	0 1 0	..	..	34	2	..	..	228	..
Golden Falls ..	30 April, 1897	728	728	..	80,000	0 0 1½	0 0 0½	500	19	2	..	..	737	..
Sheridan (Limited) ..	9 July, 1897	130,000	6,000	80,000	180,000	0 2 4½	..	..	171	10	23	66	3,610	..
Karaka (Limited) ..	23 Feb., 1897	..	..	..	..	..	..	..	..	8	..	20	1,709	..
Mahara Royal (Limited) ..	27 Sept., 1896	..	..	1	..	..	..	..	..	30	..	941	9,316	..
Waitekauri Cross (Limited) ..	6 Aug., 1896	..	..	..	75,000	0 0 7½	..	..	..	35	..	..	6,259	..
New Mint ..	8 Sept., 1896	6,000	655	900	60,000	0 4 6	620 3 6	..	66	2	..	..	641	..
Bunker's Hill (Limited) ..	21 June, 1896	15,000	7,500	6,000	60,000	0 0 4	..	..	354	10	138	414	8,898	..
May Queen-Hauraki (Limited) ..	2 July, 1896	200,000	7,500	192,500	200,000	1 0 0	..	..	450	48	990	2,545	18,815	..
Waiohahi (Limited) ..	1 Aug., 1871	18,000	15,000	..	6,000	2 10 0	..	..	48	17	58,570	163,881	138,978	34,500
Great Kapanga ..	26 Oct., 1895	9,600	533	..	64,000	0 0 2	..	..	156	3	..	..	2,088	..
Young New Zealand ..	31 Oct., 1895	9,750	543	..	65,000	0 0 2½	133 16 10	..	139	4	..	18	2,730	..
Royal Shield ..	2 Oct., 1896	10,000	250	..	80,000	0 0 2	191 3 1	34,123	64	2	..	..	1,272	..
Puketuan ..	20 Sept., 1895	6,000	1,500	..	60,000	0 0 6	..	500	220	2	6	..	1,498	..
West Derby ..	21 Oct., 1896	7,000	619	..	70,000	2-1d.	189 3 4	..	84	..	..	..	607	..
Jersey ..	9 Sept., 1896	4,000	466	..	80,000	1-4d.	..	30,889	46	2	51	141	533	..
Matawai ..	12 Sept., 1895	6,000	1,243	..	60,000	4-9d.	..	27,085	46	2	1	1	1,186	..
Martha Extended ..	26 Feb., 1896	9,000	1,683	..	90,000	4-4d.	..	..	82	..	..	..	1,617	..
Hinemoa-Hauraki ..	14 Jan., 1897	6,000	831	..	80,000	2-4d.	..	..	89	4	..	..	796	..
Invicta ..	11 July, 1895	11,500	1,317	..	115,000	2-7d.	..	14,028	384	..	190	370	1,773	..
Irving ..	17 Dec., 1896	9,950	1,185	..	99,500	2-8d.	..	..	109	..	..	..	695	..
Golden Shore ..	9 Sept., 1897	7,500	750	..	75,000	0 0 4	..	..	10	10	..	..	497	..
Fortuna No. 2 ..	16 July, 1896	7,500	750	..	75,000	2-4d.	..	..	125	..	..	..	743	..
Harbour View ..	27 June, 1895	16,000	1,938	..	160,000	0 0 2	298 4 1	7,050	361	4	1	4	1,808	..
Ni Desperandum ..	20 Sept., 1895	16,000	1,529	..	160,000	2-5d.	117 1 5	15,706	263	2	4	12	2,237	..
Napier ..	7 Nov., 1895	12,000	1,158	..	80,000	3-4d.	..	..	78	2	..	145	1,276	..
Norena ..	17 Jan., 1896	7,800	750	..	73,000	2-4d.	..	..	95	..	..	..	740	..
Mount Aurum ..	31 Jan., 1896	8,000	745	..	70,000	0 0 2½	246 13 4	59,300	23	..	..	..	779	..
North ..	4 Sept., 1895	7,000	1,034	..	70,000	3-7d.	..	1,700	99	..	..	..	900	..
Princes Regent ..	8 Sept., 1896	6,800	665	..	68,000	2-8d.	..	..	68	..	..	..	665	..
Wynyardton ..	14 Nov., 1895	10,500	2,401	2,100	70,000	10-2d.	..	1,167	124	..	..	..	2,352	..
Star of Waiki ..	16 Oct., 1896	6,000	900	..	80,000	2-7d.	..	..	122	1	..	..	722	..
Southern Cross ..	18 Sept., 1896	8,000	1,050	..	80,000	3-9d.	..	..	62	..	..	..	948	..
Moa ..	2 Sept., 1896	8,000	582	..	80,000	1-6d.	184 1 8	64,850	48	..	..	..	510	..
Great United ..	10 Oct., 1895	6,500	1,181	..	65,000	4-3d.	89 11 8	9,600	104	..	..	..	..	..



STATEMENT OF AFFAIRS OF MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—continued.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT—continued.														
Aotea Gold and Silver ..	23 Nov., 1896	4,000	539	..	80,000	0 0 1	489 1 10	..	96	6	Os.	£	540	..
Wahi South (Limited) ..	18 June, 1896	18,000	5,760	..	120,000	0 2 0½	..	825	170	15	..	..	6,296	..
Portsea (Limited) ..	14 Mar., 1894	11,250	776	4,500	45,000	0 0 3½	..	2,900	119	..	..	..	770	..
Kaitake Gold and Silver ..	23 Nov., 1896	4,000	898	..	80,000	0 0 2½	..	1,850	103	6	..	..	898	..
New Goleconda ..	22 Aug., 1895	10,000	4,548	..	100,000	0 0 0½	74 13 9	..	233	4	..	..	3,905	..
Sovereign ..	11 Mar., 1896	15,000	1,500	..	100,000	..	..	..	227	4	..	..	1,322	..
Juno ..	8 Mar., 1896	8,889	1,552	..	71,119	0 0 3	114 2 1½	1,750	114	2	84	192	1,745	..
Excelsior ..	29 Aug., 1895	7,863	1,301	..	49,125	0 0 3½	97 6 10½	9,400	65	2	..	..	1,290	..
Golden Horn ..	25 June, 1896	6,853	656	..	68,534	0 0 1	129 3 4	..	145	3	2	7	889	..
Golden Lead ..	12 July, 1895	16,800	1,923	..	168,000	0 0 1½	49 19 6½	59,920	183	4	..	13	1,947	..
Onitasser ..	18 June, 1896	6,000	1,124	..	60,000	0 0 2	0 10 5	1,600	103	3	35	97	1,209	..
Hauraki North (Limited)	31 July, 1895	129,028	2,270	59,657	129,028	£1 & -/10	619 17 8	4,969	255	20	559	1,573	9,415	..
Grace Darling (Limited)	30 Jan., 1894	30,000	5,308	..	60,000	0 7 0	0 4 3	..	207	5	129	171	8,719	..
Original Great Barrier Gold and Silver	23 Nov., 1896	6,000	816	..	80,000	0 0 1½	..	..	91	6	..	..	995	..
Wahi Extended (Limited)	12 Aug., 1895	149,967	2,624	..	149,967	1/1 & -/1	..	387	362	4	..	..	2,742	..
Union Wahi (Limited) ..	20 Nov., 1895	141,250	375	100,000	..	0 10 0	..	..	33	45	..	..	24,565	..
Ohinemuri Syndicate (Limited)	4 Mar., 1896	45,904	2,072	..	60,000	1 0 0	..	..	277	30	..	..	9,573	..
Hauraki South (Limited)	21 Nov., 1896	75,000	..	..	18,000	1 0 0	..	..	83	21	..	..	3,180	..
Wahi Gladstone (Limited)	23 July, 1896	90,000	..	70,000	10,000	..	..	..	..	23	..	..	4,041	..
Monowai Gold-mines (Limited)	20 June, 1896	25,000	12,360	125,000	150,000	0 10 0	240 0 0	..	324	30	..	..	10,039	..
Waiteauri United (Limited)	1 July, 1896	135,000	..	50,000	150,000	1 0 0	..	..	180	45	..	..	12,639	..
Takateas Consols Gold-mines (Ltd.)	21 May, 1896	88,107	..	66,000	100,000	1 0 0	..	..	1	10	..	135	2,482	..
Wahi-Silverton Extended (Ltd.)	1 Feb., 1895	69,757	..	30,000	100,000	1 0 0	240 10 0	..	144	85	..	28,618	57,640	..
Waiteauri Union Claims (Ltd.)	15 Dec., 1896	24,407	..	230,007	300,000	1 0 0	..	..	1	61	..	31,547	8,764	..
Woodstock (Limited) ..	30 July, 1895	150,000	40,625	112,500	38,862	1 0 0	..	..	104	223	365,540	..	54,284	..
Kauri Freehold Gold Estates (Ltd.)	1 June, 1896	250,000	60,000	190,000	250,000	1 0 0	..	..	..	246	..	..	24,892	..
Gloucester (Limited) ..	19 Feb., 1897	92,519	..	78,500	960,000	..	..	..	..	17	..	..	6,794	..
New Zealand Crown Mines (Ltd.)	27 June, 1896	200,000	..	100,000	200,000	1 0 0	..	..	101	255	{ Gold, 13,262 Silver, 14,933	58,171	48,170	652
Hauraki Golden Age Mines (Ltd.)	23 Aug., 1895	..	..	..	..	..	..	..	..	30	..	..	7,650	..
Pigmy ..	31 Nov., 1895	10,500	1,850	..	72,200	0 0 8	..	..	149	..	..	..	1,442	..
Scandinavian ..	21 Nov., 1895	11,250	2,746	..	75,000	0 0 8	..	..	163	..	..	140	4,819	1,093
Atlas ..	23 July, 1896	9,000	1,703	..	90,000	0 0 0½	58 13 11	5,218	96	..	..	..	1,692	..
Wahi Grand Junction (Limited) ..	27 Jan., 1896	150,000	..	123,500	21,616	1 0 0	..	..	15	50	..	..	26,123	..
Tui Gold-mines (Limited)	28 Sept., 1896	75,625	..	20,000	20,000	1 0 0	..	..	10	8	..	..	3,571	..
Norman Proprietary Gold-mines (Limited)	17 Nov., 1896	75,000	..	52,439	11,250	1 0 0	..	..	46	7	..	..	2,086	..
Golden Spark ..	16 Dec., 1895	7,400	..	..	74,000	..	..	..	70	..	7	30	818	..
Wataia (Limited)	6 June, 1890	15,000	1,325	84	58,737	..	44 13 6	..	128	..	710	2,070	4,094	559
Hauraki (Limited)	2 April, 1895	40,000	..	8,750	200	0 2 6	..	..	1	130	74,651	228,788	64,070	..
Great Mercury ..	10 Sept., 1897	6,288	303	..	75	0 2 0	..	..	1	18	106	259	1,796	..
Totals	..	4,208,458	482,169	2,260,392	16,476,550	..	10,612 8 5	1,784,009	21,972	2,011	Gold, 519,087 Silver, 14,933	534,137	902,889	37,551

## NELSON DISTRICT (INCLUDING WEST COAST).

	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007	3008	3009	3010	3011	3012	3013	3014	3015	3016	3017	3018	3019	3020	3021	3022	3023	3024	3025	3026	3027	3028	3029	3030	3031	3032	3033	3034	3035	3036	3037	3038	3039	3040	3041	3042	3043	3044	3045	3046	3047	3048	3049	3050	3051	3052	3053	3054	3055	3056	3057	3058	3059	3060	3061	3062	3063	3064	3065	3066	3067	3068	3069	3070	3071	3072	3073	3074	3075	3076	3077	3078	3079	3080	3081	3082	3083	3084	3085	3086	3087	3088	3089	3090	3091	3092	3093	3094	3095	3096	3097	3098	3099	3100	3101	3102	3103	3104	3105	3106	3107	3108	3109	3110	3111	3112	3113	3114	3115	3116	3117	3118	3119	3120	3121	3122	3123	3124	3125	3126	3127	3128	3129	3130	3131	3132	3133	3134	3135	3136	3137	3138	3139	3140	3141	3142	3143	3144	3145	3146	3147	3148	3149	3150	3151	3152	3153	3154	3155	3156	3157	3158	3159	3160	3161	3162	3163	3164	3165	3166	3167	3168	3169	3170	3171	3172	3173	3174	3175	3176	3177	3178	3179	3180	3181	3182	3183	3184	3185	3186	3187	3188	3189	3190	3191	3192	3193	3194	3195	3196	3197	3198	3199	3200	3201	3202	3203	3204	3205	3206	3207	3208	3209	3210	3211	3212	3213	3214	3215	3216	3217	3218	3219	3220	3221	3222	3223	3224	3225	3226	3227	3228	3229	3230	3231	3232	3233	3234	3235	3236	3237	3238	3239	3240	3241	3242	3243	3244	3245	3246	3247	3248	3249	3250	3251	3252	3253	3254	3255	3256	32
--	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	----



## STATEMENT OF AFFAIRS OF MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—continued.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.		Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
						£	s. d.					Oz.	£		
OTAGO DISTRICT.															
Achilles Goldfields (Limited)	15 Mar., 1893	91,660	11,660	80,000	733,287	£	s. d.	£	s. d.	2,227	108	12,898	49,689	61,358	..
Tuapeka Dredging (Limited)	31 July, 1897	2,530	911	..	2,530	0 10 0	203 15 0	..	..	28	..	..	..	201	..
Evans Flat Dredging (Limited)	14 Aug., 1897	2,480	711	..	2,480	0 7 6	69 6 0	..	..	34	..	..	..	101	..
Success Gold-dredging (Limited)	16 July, 1897	2,400	2,400	..	2,400	1 0 0	..	..	..	14	7	54	210	2,555	..
Jutland Flat (Waipori) (Limited)	2 July, 1890	15,000	4,000	3,750	15,000	8/ & 15/	..	..	..	40	10	6,054	23,627	16,424	5,625
Upper Waipori Alluvial Gold-dredging (Limited)	3 Sept., 1889	12,000	5,950	5,000	24,000	0 8 6	..	..	..	85	9	8,372	32,174	28,188	4,200
Golden Treasure Dredging (Ltd.)	19 July, 1891	1,500	1,384	1,500	3,000	1 0 0	..	..	124	22	6	4,186	16,119	11,103	6,399
Golden Run Dredging (Limited)	29 June, 1891	4,000	4,737	2,000	6,000	1 0 0	..	..	1,085	70	15	4,681	18,031	18,886	5,193
Etrick Gold Steam-dredg. (Ltd.)	29 Aug., 1890	2,500	1,937	2,000	4,500	0 15 6	..	..	..	44	6	3,582	13,789	13,030	2,475
Roxburgh Gold Steam-dredging (Limited)	20 Aug., 1891	2,500	2,461	2,500	5,000	1 0 0	38 15 0	..	..	53	1	3,029	11,652	10,847	3,975
Benger Burn Gold-dredging (Ltd.)	20 Sept., 1897	1,800	1,093	..	1,635	0 13 4	..	..	..	20	6	55	211	937	..
Golden Gate Dredging (Limited)	13 Mar., 1895	2,500	2,500	..	2,500	1 0 0	..	..	..	44	7	2,101	8,102	7,651	3,000
Clyde Dredging (Limited)	17 May, 1895	3,850	3,850	150	4,000	1 0 0	..	..	..	51	7	2,991	11,537	5,285	5,400
Matau Dredging (Limited)	16 Oct., 1897	7,000	1,406	800	7,000	0 5 0	146 2 6	..	..	117	..	..	..	229	..
Rex Hill Tin-mining (Limited)	3 Nov., 1892	3,750	3,708	1,000	16,000	10/ & 5/	38 7 6	..	150	58	1	..	..	3,919	..
Sunrise	14 Oct., 1897	3,890	376	..	7,780	0 1 0	12 10 0	..	..	62	4	..	..	295	..
Enterprise Gold-dredging	24 Aug., 1891	2,000	2,000	..	2,000	1 0 0	..	..	..	16	7	2,959	11,393	11,292	1,721
Alpha (Preservation Inlet)	4 Sept., 1897	24,000	2,400	12,000	24,000	(B. 4/) (A. 20/)	..	..	..	100	15	..	..	1,509	..
Deep Stream Amalgamated Hydraulic Sluicing (Limited)	4 Feb., 1897	6,500	6,488	3,500	10,000	1 0 0	11 5 0	..	..	67	64	..	..	8,590	..
Barewood Quartz-mining (Limited)	18 Sept., 1895	420	420	2,400	84	5 0 0	..	..	..	24	..	989	3,560	4,236	451
Manorburn Gold-dredging (Ltd.)	28 Jan., 1896	3,000	3,000	..	3,000	1 0 0	..	..	..	7	7	965	3,729	7,080	..
Phoenix Water-race (Registered)	12 Oct., 1867	1,500	1,500	..	1,000	1 10 0	..	..	..	22	..	..	..	..	6,075
Ourawera (Limited)	23 May, 1895	1,600	..	1,000	1,600	1 0 0	..	..	..	15	9	1,160	4,583	5,879	320
Turakina Gold-dredging (Limited)	27 May, 1897	4,000	2,990	1,000	4,000	1 0 0	10 0 0	..	..	8	7	20	78	3,368	..
Waiau Beach Hydraulic Elevating	11 Feb., 1897	4,150	815	1,500	8,320	(A. 10/) (B. 3/5)	0 16 8	..	150	23	5	..	..	655	..
Morning Star	26 Jan., 1895	24,000	2,542	12,000	24,000	(B. 4/3) (C. 3/10)	32 3 5	..	487	98	64	8,903	35,872	27,197	11,462
Golden Site Extended (Limited)	11 Feb., 1897	57,828	2,865	43,750	57,828	(A. 17/6) (B. 7/6)	70 1 9	..	..	120	15	2	8	3,214	..
Empire Gold-dredging (Limited)	18 July, 1897	3,200	880	..	3,200	0 5 6	..	..	..	27	..	..	..	769	..
Parrawa Water-supply and Gold-mining (Limited)	9 July, 1896	1,500	1,500	..	1,500	1 0 0	..	..	..	31	5	..	74	1,971	..
Blue Spur and Gabriel's Gully Consolidated (Limited)	1 Feb., 1888	89,066	30,000	60,000	{Ord. 82,238 Pref. 8,968}	1 0 0	..	..	..	..	45	25,701	100,241	120,323	15,787
Sailor's Gully (Waitahuna) (Ltd.)	3 June, 1886	2,000	100	1,800	2,000	0 10 0	..	..	..	8	5	254	933	1,556	..
Island Block (Limited)	23 Nov., 1888	56,187	..	25,816	56,187	1 0 0	..	..	..	150	16	..	42,590	94,727	..
Dunedin Gold-dredging (Limited)	1 Sept., 1881	8,700	7,540	..	8,700	0 17 4	..	..	..	70	9	15,366	59,154	44,510	14,885
Ophir Deep Lead (Limited)	16 Dec., 1897	800	330	400	2,000	0 4 0	80 0 0	..	..	20	13	..	..	241	..

Waimumu Gold-dredging (Ltd.) ..	20 Nov., 1897	5,000	816	1,000	6,000	0 4 0	183 10 0	..	825	45	..	12,674	40,000	47,391	14,311
Roxburgh Amalgamation Mining and Sluicing (Limited)	2 Mar., 1889	29,152	13,737	15,000	29,152	18/ & £1	..	..	..	141	30	..	..	..	..
Lion Rock Gold-dredging (Limited)	18 Mar., 1897	3,000	2,853	500	3,500	1 0 0	146 17 6	..	..	32	4	..	..	2,098	..
Bakery Flat Sluicing (Limited)	10 Sept., 1896	2,500	1,752	500	3,000	0 14 6	50 0 0	..	..	27	12	181	694	1,949	..
Westralia and New Zealand Gold Explorers (Limited)	4 Feb., 1896	6,388	1,595	..	63,839	0 3 0	..	..	..	34	15	991	9,689	8,072	..
Glenrock Consolidated (Limited)	1 July, 1895	45,000	45,000	..	450,007	0 10 0	6,000 0 0	..	3,105	1,600	50	3,553	14,104	18,487	..
Golden Point Dredging (Limited)	31 Aug., 1897	5,400	1,306	..	5,400	0 5 0	43 15 0	..	..	68	..	..	..	163	..
Skipper's Sluicing (Limited)	30 July, 1897	3,000	1,800	..	3,000	0 12 0	..	..	..	20	10	..	..	1,658	..
Otago Gold-dredging (Limited)	20 May, 1895	4,000	2,000	2,000	4,000	1 0 0	..	..	..	46	6	1,697	6,572	5,152	1,900
New Eldorado Sluicing Co. (Ltd.)	17 April, 1893	2,942	1,198	1,570	2,942	1 0 0	58 0 0	..	..	57	11	..	..	1,377	..
Golden Crown Dredging (Limited)	21 Dec., 1896	3,300	3,300	200	3,500	1 0 0	..	..	..	57	7	56	216	4,370	..
O.P. 2 (Waipori Gold mines) (Ltd.)	1 April, 1897	..	..	..	150,000	..	..	..	..	..	98	..	..	11,536	..
Hartley and Riley Beach Dredging (Limited)	14 July, 1897	5,000	2,302	200	5,000	0 12 6	710 0 0	..	..	..	78	..	..	828	..
Tatari Gold-sluicing (Limited)	16 July, 1896	4,440	650	3,790	4,440	1 0 0	..	..	..	13	10	..	..	2,060	..
Golden Lead Gold-dredging (Ltd.)	— Mar., 1896	2,600	2,600	400	300	1 0 0	..	..	..	24	6	370	1,477	4,759	..
Nevis Gold-dredging (Limited)	10 Nov., 1896	2,000	1,445	300	2,000	1 0 0	254 10 0	..	..	22	6	..	932	3,003	..
Round Hill (Limited)	30 July, 1892	28,225	6,753	21,473	6,649	5 0 0	..	..	..	180	52	4,778	28,471	26,207	..
Magnetic Gold-dredging (Limited)	13 July, 1897	5,000	1,298	2,000	7,000	0 7 6	585 10 0	..	..	79	2	..	..	646	..
New Sandhills Gold-dredg. (Ltd.)	22 April, 1896	1,250	1,312	..	2,500	0 2 6	..	..	..	3	9	770	2,937	3,300	125
Golden Beach Hydraulic Elevat- ing and Gold-dredging (Ltd.)	20 Aug., 1897	6,000	1,739	7,000	18,000	0 7 0	322 18 0	..	125	140	11	18	71	250	..
Totals	..	614,003	205,970	318,299	1,902,026	..	9,068 3 4	6,051	6,051	6,263	880	129,410	550,568	595,822	108,004
Grand totals..	..	6,112,253	1,115,463	8,198,539	20,014,448	..	21,595 0 8	1,818,987	1,818,987	80,165	3,642	809,976	1,646,835	2,448,255	344,312

\* Company's property is leased.

## PROSPECTING LICENSES.

Eighty-three licenses for prospecting outside mining districts for purpose of searching for gold or other minerals excepting coal have been issued in favour of the under-mentioned persons:—

Date.	License.	Locality.
30/4/97	Joseph Bryan .. .. .	Sinclair, Fox, Mount Peel, Ackland, Four Peaks, Orari, Clyde, Tripp, and Heron Survey Districts.
30/4/97	Murray, Heney, Orton, and Macdonald	Ackland and Mount Peel Survey Districts.
30/4/97	" " " "	"
30/4/97	" " " "	"
6/5/97	F. Bay .. .. .	Ackland, Mount Peel, Orari, and Four Peaks. Whitcombe, Glenrock, Clyde, Heron, Somers, Hutt, Potts, Tripp, and Alford Survey Districts.
5/5/97	W. McGrath .. .. .	Shingle reserves, Shag River.
14/5/97	H. Nichols .. .. .	"
14/5/97	J. Brophy .. .. .	"
14/5/97	J. McIlroy .. .. .	"
14/5/97	T. Rae .. .. .	"
6/5/97	R. M. Houston and R. Bell .. .. .	Mount Peel, Orari, Four Peaks, and Ackland Survey Districts.
26/5/97	H. Curlett .. .. .	For copper over Omaunu No. 2 Block.
26/5/97	J. A. Robertson .. .. .	Ackland and Mount Peel Survey Districts.
26/5/97	W. Wadworth .. .. .	Hororata and Fighting Hill Survey Districts.
4/6/97	H. H. Scott .. .. .	Sections 28, 30, 31, Lindhurst Hundred.
4/6/97	J. J. F. Pearce .. .. .	"
4/6/97	J. Scott .. .. .	"
4/6/97	T. Anderson, J. McQuarters .. .. .	Geraldine and McKensie Counties.
4/6/97	" .. .. .	"
2/6/97	D. Wadsworth .. .. .	Ackland, Mount Peel, Four Peaks, and Orari Survey Districts.
1/6/97	A. Roper .. .. .	Block V., Lindhurst Survey District.
7/6/97	F. Rodgers .. .. .	Mount Peel, Orari, Four Peaks, and Ackland Survey Districts.
19/8/97	J. Drysdale and J. W. Robertson .. .. .	Waimea Survey District.
18/6/97	E. W. Lorgelly .. .. .	Foreshore, near Clutha River.
17/6/97	John Maar .. .. .	Mount Peel, Orari, Four Peaks, and Ackland.
27/7/97	Otway and party .. .. .	Alford and Tripp Survey Districts.
9/7/97	J. Tarling .. .. .	Hokonui Survey District.
9/7/97	J. R. Brunt .. .. .	Hororata.
1/8/97	J. Newport .. .. .	"
26/2/98	W. Dansey .. .. .	Maungatapu Survey District.
4/8/97	D. P. Clements .. .. .	Rotorua.
9/9/97	T. F. King .. .. .	Coast Survey District.
22/9/97	J. Jacenthos .. .. .	Oxford.
18/8/97	R. Houston .. .. .	Omaunu No. 2 Block.
15/9/97	J. Roland .. .. .	"
18/9/97	K. M. McLennan .. .. .	"
30/9/97	N. H. Barr .. .. .	Section 271, Block II., Waipu.
28/9/97	J. R. Hare .. .. .	Block XII., Whangaroa.
28/9/97	W. Thompson .. .. .	Omaunu No. 2.
28/9/97	C. H. Thompson .. .. .	Waipawa.
28/9/97	H. R. Thompson .. .. .	"
1/10/97	Clouston and Wairata te Wharo .. .. .	"
8/10/97	E. Mace .. .. .	Awarau Block.
8/10/97	E. Foley .. .. .	Block XV., Woodville Survey District, Maharahara.
4/10/97	D. J. Price .. .. .	"
30/9/97	Inia Maru .. .. .	Ackland and Mount Peel Survey Districts.
6/10/97	C. Pilliet and others .. .. .	Waipawa.
19/10/97	J. Thomson .. .. .	Waimea Survey District.
22/10/97	A. T. Jones .. .. .	Waiheke Island.
2/11/97	McMillan and Taylor .. .. .	Maungatapu.
2/11/97	Froggat and Taylor .. .. .	Takitimo.
1/11/97	W. A. Teague .. .. .	Te Anau.
13/11/97	Robert Hay .. .. .	Taupo District.
29/11/97	S. Richmond .. .. .	Port Molyneux foreshore.
16/11/97	John Barry .. .. .	Tararua Ranges.
17/11/97	J. and W. J. Barry .. .. .	Lindhurst Hundred.
9/11/97	G. Blake .. .. .	"
23/11/97	P. H. Oatway .. .. .	Taupo District, all Crown lands.
16/12/97	W. Milner .. .. .	Coast District.
13/12/97	W. Hunter .. .. .	Head of Raukokore River.
21/12/97	G. Rabone .. .. .	Pahiatua and Oroua Counties.
13/12/97	H. F. Doogan .. .. .	Tararua Ranges.
13/12/97	M. Sullivan .. .. .	Waimea, Maungatapu.
13/12/97	P. F. Daniel .. .. .	"
13/12/97	T. H. Harley .. .. .	"
13/12/97	Robins and Anderson .. .. .	"
13/12/97	Houston, Harris, and Clementt .. .. .	Takitimo.
17/12/97	E. Mallory .. .. .	Omaunu No. 2.
22/12/97	E. P. Willocks .. .. .	Ruataniwha.
21/12/97	W. Taylor .. .. .	Whangamo (Nelson).
22/12/97	P. Laing .. .. .	Coast.
24/12/97	W. Taylor .. .. .	"
18/1/98	D. Stuart .. .. .	Takitimo.
18/1/98	A. T. Symons .. .. .	Mount Peel.
8/1/98	A. Barry .. .. .	Makaretu.
16/2/98	C. McLean .. .. .	Lindhurst Hundred.
7/2/98	Curtis Moore .. .. .	Napier District.
22/4/98	J. W. Mackay .. .. .	Omaunu No. 2.
15/2/98	A. Morton .. .. .	Chicken Islands.
16/2/98	H. Veale .. .. .	Otepopo Survey District.
14/3/98	R. Scott .. .. .	Moeraki.
14/3/98	W. J. Harris .. .. .	Molyneux and Coast Survey District.
		Omaunu No. 2.

### PETROLEUM.

Boring operations were continued at Moturoa, near New Plymouth. No. 5 bore-hole was continued to a depth of 2,050 ft., but it was found that here it was off the oil strata, as very little oil was got, which was not by any means "payable oil," and further boring was suspended. The company are now engaged in boring at a place near Frankley Road, about four miles and a half from Moturoa and three miles from the sea-coast. The depth of 220 ft. has been attained, but boring is slow and difficult, in consequence of piercing a strata of hard boulders and coarse gravel. Mr. Oliver Samuel, who is managing director of the company, says he "hopes they will be able to bore to 1,000 ft., but unless the company's funds are strengthened their efforts must soon cease and the work be abandoned."

In the Cheviot district a prospector named Flaherty discovered traces of petroleum in February last, a sample of which was forwarded through the department to the Colonial Laboratory for test. Mr. Skey reports that the sample submitted was of first-class quality, and one distillation should be sufficient to adapt it for use in kerosene-lamps as an illuminant.

A prospector's mining lease, over 236 acres, in the Paeroa Survey District, was granted to E. A. S. Flower, for the purpose of working for petroleum, and the attention of capitalists was turned in this direction, but, owing to various circumstances, the development of the mineral-oil industry in this locality has been deferred for a time.

---

### MANGANESE AND SULPHUR.

Mr. John Chambers, of Auckland, who for many years past has been interested in the export of those minerals, has supplied the following information: Manganese-mining has practically ceased in this district, the price in Europe being too low to warrant any one shipping. A few small lots have been shipped to Australia for chemical-works, &c., but I do not think it will reach 100 tons for the year. 2,000 tons of sulphur has been shipped to Sydney from Rotorua, but the price has been very low—about £2 5s. per ton D/D f.o.b. Auckland. This price is really below its intrinsic value. This is for 70-per-cent. ore.

---

### OPALS.

In December last I paid a visit to the Mount Peel district, where nine leases, of a total area of 232 acres and 17 perches, have been taken up for the purpose of working for opals. Samples of the stone found there were taken for subsequent examination, when it was discovered that, although of an opaline nature, these specimens were of a different and distinct variety to the stone previously stated to have been unearthed at this place, and have no commercial value. Little capital had at that time been expended on development operations, the lease of the Record Reign Opal-mining Company being the only one on which even preparatory work had been done. It is to be feared that no importance can be attached to this discovery as an addition to the mineral wealth of the colony.

The company which was formed to work the opal deposits in the Tairua district did not carry on operations to any considerable extent, but I am informed that a party of miners intend shortly commencing to work the opals, which are of a superior quality, in this locality.

---

### SCHEELITE, WOLFRAM, AND MOLYBDENITE.

During the year several inquiries have been received from the Australian Colonies and Europe for information as to the scheelite deposits in the colony, and details of the workings of the late Otago Scheelite Company, at Lake Wakatipu, have been furnished. Messrs. Donaldson, of Golden Point, Macrae's, have worked a deposit of this mineral, for which the demand appears, however, to be very intermittent. Inquiries have also been made with reference to molybdenite, of which mineral a discovery was reported at Cobden during the early part of the year. Wolfram-ore has also been inquired for by German merchants, who were referred to the report of the Government Geologist published some years ago. It is not considered probable that the demand for the minerals above alluded to will prove sufficient to induce any extensive operations to be undertaken in their development.

---

### COPPER DEPOSITS AT OMAUNU No. 2 BLOCK, WHANGAROA COUNTY.

A report has been forwarded to the Hon. the Minister of Mines by Mr. Alexander McKay, F.G.S., Government Geologist, on the deposits of copper at Omaunu No. 2 Block, Kaero Survey District, Whangaroa County. He states that at the point where copper-ore was first discovered in the bed of the creek some endeavour has been made to ascertain the size and direction of the reef, and the character of the rocks with which it is associated. A shaft was sunk on the east bank of the creek close to the outcrop of the lode as seen in the bed of the creek, but this was beyond the outcrop, and, the dip of the lode being north, the rocks on the foot-wall side of the lode were cut into, and no ore of any kind was met with in a depth of 30 ft. From the bottom of the shaft a drive was made in a north-west direction till the line of creek-channel was driven across at a point where ore showed vertically over the drive; but, the drive being nearly in the direction or strike of the

lode, this, as far as carried, continued in the foot-wall, and failed to show the presence of ore. The original outcrop in the creek-bed showed as a mass of angular blocks that crossed the creek apparently in a west-north-west direction, or nearly at right angles to its course, and which continued up and down the creek some 10 ft. or 12 ft., and constituted the bed of a miniature rapid thus formed.

The ore at the surface consisted mainly of iron-pyrites, but many of the blocks, on being broken into, showed the presence of yellow copper-ore of good quality, and the sample originally thus taken and tested at the Colonial Laboratory, Wellington, yielded over 30 per cent. of copper.

To lay bare the outcrop the loose blocks in the creek were removed, and all loose material from the foot-wall side of the lode to where it began to be confined by the hanging-wall, but no attempt was made to trace the ore underfoot where so covered in the direction of its dip. On the west side of the creek a pit was sunk close alongside the outcropping ore, but this again was in the foot-wall of the lode, and was not so disposed as to prove anything respecting the lode itself. On both sides the copper-ore has a tenacious clay of a blue colour, which must be regarded as lying between the walls proper. The lode itself is mullocky, and quartz is almost absent.

The rocks exposed in the shaft and drive, and developed on the foot-wall side of the lode, are sandstones and shales of a type such as characterizes the young Secondary rocks of the district, and are calcareous in character like the rocks of the Pu Puke Lower Valley. The nature of the hanging-wall outside the "pug band" has not yet been definitely ascertained. On this side there is, and apparently over the pug band of the hanging-wall, a thick band of iron-gossan, which, though completely oxidized, still seems to indicate a massive body of pyritous ore, which has yet to be cut into and explored. A pavement of boulders of volcanic rock is met with in the bed and banks of the creek, and for 5 or 6 chains above the outcrop of ore the nature of the rocks cannot be ascertained till some distance away from the creek. Further towards its source the banks of the creek show rocks *in situ*, which, however, are decomposed, and a little higher up, at the waterfall, pass into the serpentine. In these rocks copper-ore again appears, some large blocks occurring in the bed of the creek, and others appear in the right bank (which, however, seems at this place to be slipped ground), while at the foot of the waterfall cliff a considerable block of ore lies wedged in a fissure of the rock at that place. From the few facts that could be observed at and near the waterfall Mr. McKay concluded that the direction of the ore band must be nearly east and west, and, as boulders of ore were reported to occur in a branch of the creek east of the waterfall, he traced the east line across the intervening spurs, and—perhaps but a coincidence—this brought him to within a chain of where the ore boulders were met with in the branch creek. This determination he had to accept, there being no better means possible, short of some time and considerable labour.

Following down the branch creek (Frenchman's) to the first-described and more important outcrop with the compass, he endeavoured to follow from that a west line through the bush to the southern boundary of the claim. This resulted also in bringing him to within about 2 chains from where an outcrop of ore is reported present near the westward boundary of the claim. This seemed to confirm the supposition that the lodes strike east and west magnetic; but on returning to the main outcrop he arrived at the conclusion that probably the true bearing is more to the north, as indicated by the direction of the outcrop in the creek-bed and of the gossan outcrop on each bank of the creek. There is reason, therefore, to believe that the true course of the lode is from between west-north-west and north-west to the opposite point in a south-east direction. In the opposite direction the lodes should pass into claim No. 3, east of and adjacent to the Prospectors' and Prospectors' No. 2.

Owing to the scattered condition of the vein stuff and mullocky walls as far as seen, but yet more owing to the mistake made in sinking and driving in and along the foot-wall rocks, an impression prevails that the ore seen at the surface, and as far as proved at the principal outcrop, is only a slip from a lode *in situ* higher up the creek, which has yet to be discovered. In order to arrive at a conclusion with respect to this matter the prospectors placed men at the Government Geologist's disposal. A trench north along the bed of the creek was made, and when the ore disappeared underfoot a hole was sunk to prove its presence under the supposed hanging-wall of pug-clay, first at about 1 ft. below the level of the outcrop, and at a further distance at a greater depth of some 2 ft. 6 in. Mr. McKay then directed that the trench should be continued in the direction of the dip, and a hole sunk in a position at which some 10 ft. or 12 ft. of rock should be passed through before reaching the upper surface of the ore. So far as he could see, there seems every probability of the ore being in place, while yet it is possible it may not be. Even then, should the latter contingency be the case, the lode *in situ* cannot be far to seek, since it must be somewhere in the distance between the principal outcrop and the waterfall, some 6 chains higher up the creek. He could not estimate correctly the thickness of the ore band, but thought it must be at least 6 ft.

The quality of the ore improved as cover made on the hanging-wall side, but, as poor and high-class ore has been obtained from the very surface, it is a general improvement in the bulk of the ore that is to be looked for and expected. No samples were taken for assay, because sufficient from near the surface had already been taken and reported upon, giving returns up to 34 per cent. of copper, and it is from greater depths that a general average should be obtained.

#### RECORDS OF MINING OPERATIONS.

The system of recording the monthly return of operations carried on in the various portions of the mine, together with the return of gold, &c., which is adopted by Captain Hodge, the manager of the Hauraki Gold-mining Company, for presentation to the directors, is so comprehensive and worthy of general adoption that it is considered advisable to publish a copy of the statement for general information.

## TUTWORK MEASUREMENTS for the Thirteen Lunar Months ending 11th December, 1897.

Four Weeks ending ..	9th Jan.	6th Feb.	6th Mar.	3rd April.	1st May.	29th May.	26th June.	24th July.	21st Aug.	18th Sept.	16th Oct.	13th Nov.	11th Dec.	Total.
No. 1 reef—	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Driven on	...	...	...	...	...	...	...	14	56	...	...	...	...	70
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
No. 2 reef—														
Driven on	96	14	...	...	36	...	...	8	...	22	...	...	...	176
Rises	19	18	8	21	12	11	...	14	...	...	...	...	...	103
Winzes	...	34	...	...	...	...	...	...	...	...	...	...	...	34
Stopping	105	113	193	121	65	129	228	326	167	64	86	99	...	1696
No. 3 reef—														
Driven on	...	23	...	...	...	...	...	...	47	...	...	...	...	70
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	3	...	...	...	...	...	...	...	...	...	...	...	3
Stopping	...	...	32	50	14	26	36	40	126	51	...	...	26	401
No. 4 reef—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
No. 6 reef—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iona reef No. 1—														
Driven on	...	...	...	...	...	...	30	32	...	...	...	...	...	62
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iona reef No. 2—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	25	...	25
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iona reef No. 3—														
Driven on	16	...	...	...	...	30	...	...	...	...	...	...	...	46
Rises	...	...	16	...	...	...	...	...	...	...	...	...	...	16
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	88	97	112	55	174	160	180	117	34	113	110	87	52	1329
Cross reef No. 1—														
Driven on	22	28	6	...	38	18	...	...	...	...	...	...	...	112
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	18	...	12	6	...	...	...	...	...	...	...	...	...	36
Stopping	105	73	102	70	66	64	77	60	...	...	...	...	16	633
Cross reef No. 2—														
Driven on	...	...	7	...	39	...	...	...	59	...	...	38	51	194
Rises	...	...	...	...	...	14	...	...	...	...	...	...	...	14
Winzes	...	...	33	11	...	16	8	...	...	...	...	...	...	68
Stopping	...	...	...	...	...	...	48	62	26	48	71	79	87	421
Castle Rock reef No. 1—														
Driven on	38	56	...	...	26	32	10	...	...	...	...	...	...	162
Rises	...	...	...	...	...	...	11	...	...	...	...	...	...	11
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Castle Rock reef No. 2—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	20	36	56
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
New Year's reef—														
Driven on	...	...	...	...	...	...	...	...	...	29	...	...	...	29
Rises	...	...	...	...	...	...	...	...	...	23	...	...	...	23
Winzes	...	...	...	...	...	...	...	...	...	...	10	...	...	10
Stopping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Intermediate reef—														
Driven on	...	...	...	5	...	...	...	...	...	23	54	15	...	97
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	11	...	...	11
Stopping	...	...	...	...	...	...	...	...	...	...	...	51	28	79

TUTWORK MEASUREMENTS for the Thirteen Lunar Months ending 11th December, 1897—  
*continued.*

Four Weeks ending ..	9th Jan.	6th Feb.	6th Mar.	3rd April.	1st May.	29th May.	26th June.	24th July.	21st Aug.	18th Sept.	16th Oct.	13th Nov.	11th Dec.	Total.
Veins, various—	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Driven on ...	...	14	...	...	31	...	...	30	30	12	7	...	...	124
Rises ...	...	6	...	...	...	...	...	...	5	5	...	...	...	16
Winzes ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping ...	...	39	...	...	...	...	...	...	9	49	...	...	90	187
Marston's reef—														
Driven on ...	18	13	...	...	...	...	...	...	...	...	32	...	...	63
Rises ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stopping ...	...	...	10	...	...	...	...	...	...	...	49	...	...	59
Shafts sunk ...	...	...	...	...	...	...	...	...	30	...	...	7	15	52
Cross-cuts driven ...	56	30	...	...	83	64	51	42	39	...	6	9	23	403
Drives, &c., cleared	...	75	92	...	...	...	...	...	50	...	...	...	...	217
Totals ...	581	636	623	339	584	564	629	745	678	439	436	430	424	7108
<i>Summary.</i>														
Shafts sunk ...	...	...	...	...	...	...	...	...	30	...	...	7	15	52
Cross-cuts driven ...	56	30	...	...	83	64	51	42	39	...	6	9	23	403
Drives on lodes, &c.	190	148	13	5	170	80	40	84	192	86	93	98	87	1286
Rises ...	19	24	24	21	12	25	11	14	5	28	...	...	...	183
Winzes ...	18	37	45	17	...	16	8	...	...	...	21	...	...	162
Stopping ...	298	322	449	296	319	379	519	605	362	325	316	316	299	4805
Levels, &c., cleared	...	75	92	...	...	...	...	...	50	...	...	...	...	217
Totals ...	581	636	623	339	584	564	629	745	678	439	436	430	424	7108

## SUMMARY of TUTWORK MEASUREMENTS for the Thirteen Lunar Months ending 11th December, 1897.

	Shafts. 11 ft. by 7 ft.	Drives. 7 ft. by 6 ft.	Winzes. 7 ft. by 5 ft.	Rises. 7 ft. by 5 ft.	Stopes. 6 ft. high.
	Ft.	Ft.	Ft.	Ft.	Ft.
No. 1 reef...	...	70	...	...	...
No. 2 reef...	...	176	34	103	1,696
No. 3 reef...	...	70	3	...	401
No. 4 reef...	...	...	...	...	...
No. 6 reef...	...	...	...	...	...
Iona reef No. 1	...	62	...	...	...
Iona reef No. 2	...	25	...	...	...
Iona reef No. 3	...	46	...	16	1,329
Cross reef No. 1	...	112	36	...	633
Cross reef No. 2	...	194	68	14	421
Castle Rock reef No. 1	...	162	...	11	...
Castle Rock reef No. 2	...	56	...	...	...
New Year's reef	...	29	10	23	...
Intermediate reef	...	97	11	...	79
Veins, various	...	124	...	16	187
Marston's reef	...	63	...	...	59
In country-rock	...	52	403	...	...
Levels cleared, &c.	...	...	217	...	...
Totals ...	52	1,906	162	183	4,805

Grand total, 7,108 ft.

## GOLD RETURNS for the Thirteen Lunar Months ending 11th December, 1897.

For the Four Weeks.	Quartz.	Picked Stone.	Retorted Gold.	Melted Gold.	Price per Ounce.	Amount.	Total.
Date of period ending—	Tons.	Lb.	Oz. dwt.	Oz. dwt.	£ s. d.	£ s. d.	£ s. d.
January 9, 1897	330	727½	2,124 1	325 6 3 1 3	996 4 7		
	...	...	...	592 4 3 1 8	1,825 19 0		
	...	...	...	585 5 3 1 7	1,802 1 7		
	...	...	...	618 0 3 1 6	1,900 7 0		
February 6, "	350	485½	1,337 18	225 7 3 1 0	687 6 4		6,524 12 2
	...	...	...	1,100 1 3 1 1	3,359 14 8		
March 6, "	300	484	1,343 5	267 12 3 0 11	815 1 4		4,047 1 0
	...	...	...	449 10 3 0 2	1,352 4 11		
	...	...	...	613 2 3 0 9½	1,863 11 5		
April 3, "	350	400	1,041 3	530 14 3 0 2	1,596 10 6		4,030 17 8
	...	...	...	500 10 3 0 2	1,505 13 5		
May 1, "	400	564	1,070 7	443 11 3 0 5	1,339 17 8		3,102 3 11
	...	...	...	618 3 3 0 1	1,857 0 6		
May 29, "	350	434	1,049 7	239 15 3 0 10	729 4 10		3,196 18 2
	...	...	...	406 6 3 0 7	1,230 15 0		
	...	...	...	398 14 3 0 8	1,209 7 10		
June 26, "	380	168	712 10	471 9 3 0 9	1,432 0 7		3,169 7 8
	...	...	...	235 9 3 0 8	714 4 0		
July 24, "	350	121	519 0	515 7 3 1 0	1,571 16 4		2,146 4 7
August 21, "	300	280	534 2	529 5 3 0 9	1,607 11 11		1,571 16 4
September 18, "	300	300	517 4	511 17 2 19 10	1,531 5 8		1,607 11 11
October 16, "	350	354	617 14	612 18 2 18 8	1,797 16 10		1,531 5 8
November 13, "	280	175	557 6	552 0 2 19 8	1,646 16 0		1,797 13 10
December 11, "	235	285	454 11	450 18 2 19 4	1,337 13 4		1,646 16 0
Totals	4,275	4,778	11,878 8	11,793 3	...	...	1,337 13 4

## SUMMARY of GOLD RETURNS for the Thirteen Lunar Months ending 11th December, 1897.

Total gold won for the year ... 11,793 oz. 3 dwt.

Total quartz crushed	...	...	...	...	Tons cwt. qr. lb.
Total picked stone treated, 4,778 lb.	...	...	...	...	4,275 0 0 0

Total ore treated	...	...	...	...	2 2 2 18
-------------------	-----	-----	-----	-----	----------

Average price of gold per ounce ... £3 0s. 6·73d.

Average yield of gold per ton of ore ... 2 oz. 15 dwt. 3·48 gr.

Total value of gold ... £35,710 5s. 3d.

*Expenditure, &c.* — We have stamped during the year of general quartz 4,275 tons, and treated 2 tons 2 cwt. 2 qr. 18 lb. of picked ores, giving a value of £35,710 5s. 3d., a yield of 2 oz. 15 dwt. 3·48 gr. per ton of ore, realising an average price of £3 0s. 6·73d. per ounce; while our costs for the year have been £25,639 17s. 3d. It would be unnecessary for me to repeat these figures but for the fact that the expenditure includes considerable extraneous costs, which are all included in the expenditure named. We have equipped the Hauraki shaft with a permanent pumping plant, buildings, and renovated our shaft to the 300 ft. level, built a new changing-house for the miners, and made our plant equal to the development of a permanent mine. The same remark will also apply to the Union Beach shaft and section of the company's property, where we have erected a permanent pumping-engine, a pair of winding-engines, an air-compressor with all equipments, and drained the mine to the 180 ft. level, and in a short time I hope to have everything here in full swing. These large items of expenditure have been paid for from our returns, and in the coming year I trust will be a source of great benefit to the company, from the fact that we can now carry on sinking and open up the deeper levels in the Hauraki section. We are also equipped with machinery on the Union Beach to develop that section of the property, which I look upon, on fair development, as a mine in itself.



*Tailings.*—Our tailings from the battery I compute approximately at about 3,000 tons. I do not attach much value to all these tailings considering our ores are free milling. The cost of concentrating these for treatment will leave, I estimate, a very small margin of profit to the shareholders.

*Union Beach Property.*—As soon as we have completed the fixing of air-pipes, air-receiver, air-winze, and got our air Tangye pump in order, we propose to drain the Palmerston shaft, which is sunk 100 ft. below the 180 ft. level. We shall drain the mine to that depth, and commence the development of the Green Harp reef near the shaft, and the Cross reef near the old Tangye winze. Judging from the former history of the company, I think there is a great future in store for the shareholders in developing this portion of the property.

*Hauraki Section.*—Here we have now a permanent pumping plant, and at the 300 ft. level our No. 2 Cross reef, although small, is carrying rich ore, which is going down in the bottom of that level. Our engine-shaft has now very nearly reached a depth of 60 ft. below the 300 ft., and ere the meeting I hope to reach the 400 ft. level, to cut chamber and start cross-cutting for the reefs. The character of rock now being met with in the bottom of the shaft warrants our expectation of finding improvement in our reefs at that level. A feature of importance to the mine, also, is the Castle Rock reefs, which are dipping towards the shaft, when they enter the class rock west of our shaft that produced the enormous quantities of gold; also important are our No. 2, No. 3, and other reefs. I am looking forward to the 400 ft. level developments to show a great improvement. The rock in the shaft is all that can be desired, and the No. 2 Cross reef carrying gold below the 300 ft. augurs well for the whole of our reefs when cut at that depth. Should our reefs prove fairly productive (and speaking from indications I have no reason to doubt it), we should soon be in a position to repeat the profitable career of the company realised from above the 220 ft. level.

*Machinery.*—The machinery throughout the mine is working in good order, and is efficient for the development of a large and extensive property.

#### MINING COMPANIES ACT AMENDMENT.

During the year an Act entitled "The Mining Companies Act Amendment Act, 1897," was passed by the Legislature, with the object of amending certain of the provisions of "The Mining Companies Act, 1894," which, owing to the altered conditions under which some English and foreign companies are now operating in the colony, had been found to be practically unworkable. *Inter alia*, provision has been made in relation to foreign companies for the registration in the colony of share transfers, for a share register to be kept at the colonial office, and for the appointment of an attorney in the colony. The amending Act also deals with the sale of forfeited shares in respect to limited-liability companies and no-liability companies, and provision is made that the directors of no-liability companies shall be responsible, jointly and severally, for any debts incurred under their authority, a saving clause providing exemption in the case of directors whose protest against the expenditure has been recorded.

#### GENERAL.

The attention of legal managers and secretaries of companies has been directed to the fact that they are precluded, under section 24 of "The Mining Companies Act, 1894," from acting as share-brokers, and also that negligence in the publication of the company's statement of affairs in the *Gazette*, as provided in section 35 of that Act, renders them liable to a heavy penalty. In the case of foreign companies, regulations have been issued under which the schedule (No. 4) has been modified to enable the attorney in the colony to furnish such a statement as the Colonial Register will permit.

#### THE CYANIDE PROCESS.

"The Cyanide Process Gold-extraction Act, 1897," was passed by the Legislature during the last session, and resulted in the purchase by the Government of the patent rights of the Cassel Gold-extraction Company (Limited) in the process known as the cyanide process for extracting gold from its matrices. Upon payment of £10,000, which was made on the 10th January last, the Government secured the sole right of user of this process in the colony, with the rights of royalty on all plants employing the same, four companies—the Waihi Gold-mining Company, the Waite-kauri Gold-mining Company, the Union Waihi Gold-mining Company, and the New Zealand Crown Mines Company—only being exempted, under prior arrangements with the Cassel Company. The provision made in section 3 of the Act, whereby the patent rights were transferred as from the 20th August, 1897, enabled the Government to receive royalty from that date at the rate prescribed in the regulations subsequently issued. The Act provides that when the total sum received as royalty from users of the process reaches the amount which has been expended from the Consolidated Fund in connection with the purchase and attendant expenses a Proclamation shall be issued declaring that the process may thenceforth be used without payment of royalty. Ten licenses have been issued under the Act to mines in the northern district, two in the West Coast district, and one in the southern district. The returns of royalty for the period ending the 31st March have been £676 17s. 1d.

The following companies have taken out licenses for the use of the process:—

*Coromandel.*—Kapai-Vermont Gold-mining Company, Mariposa Gold-mining Company, Irene (Hauraki) Gold-mining Company (Limited), Great Mercury Gold-mining Company.

*Thames.*—Moanataiari Gold-mining Company (Limited), Tararu Creek Gold-mining Company (Limited).

*Ohinemuri.*—Waihi-Silverton Extended Gold-mining Company, New Zealand Talisman Gold-mining Company, Woodstock Gold-mining Company, Komata Reefs Gold-mining Company.

*West Coast District.*—E. C. Kingswell, Big River Gold-mining Company.

*Otago District.*—The Glenrock Consolidated.

The following regulations have been gazetted under the Act:—

*Regulations under "The Cyanide Process Gold-extraction Act, 1897."*

RANFURLY, Governor.

In pursuance and exercise of the powers and authorities conferred upon me by section seventeen of "The Cyanide Process Gold-extraction Act, 1897" (hereinafter called "the said Act"), and of all other powers enabling me in that behalf, I, Uchter John Mark, Earl of Ranfurly, the Governor of the Colony of New Zealand, do hereby, for the purposes of the said Act, make the regulations following, that is to say,—

REGULATIONS.

1. Every application for a license under the said Act shall be made, in the form numbered 1 in the Schedule hereto, or to that effect, to the Warden of the district wherein or nearest whereto is situate the mine wherein the licensee proposes to use or employ the patent rights referred to in the said Act.

2. Such application shall be lodged in the Warden's office either personally, or by a barrister or solicitor of the Supreme Court, or a registered mining agent.

3. As soon as practicable after receipt of such application the Warden shall issue to the applicant a license in the form numbered 2 in the Schedule hereto, or to that effect, and shall also forward a duplicate original of such license to the nearest Inspector of Mines, who shall retain and file the same.

4. Before the license is issued it shall be recorded in the Warden's Court by the Mining Registrar, in a book to be kept for the purpose, and the Mining Registrar shall certify on the face of the license that such record has been made.

5. Every license shall be deemed to be issued, and shall be held, subject to the terms and conditions following, that is to say:—

(1.) That the licensee duly and punctually pays the royalty hereinafter prescribed, and faithfully observes and complies with the provisions of the said Act, and the regulations from time to time in force thereunder.

(2.) That on breach of any of the terms and conditions subject to which the license is held, any Warden may, in his discretion, cancel the license.

6. The royalty shall be payable on the following graduated scale according to the value of all gold and silver produced from each ton of quartz or other ore in the mine wherein the said patent rights are used or employed, that is to say,—

(1.) One per cent. of such value where the same does not exceed £2 per ton;

(2.) One and a half per cent. where such value exceeds £2 but not exceed £3 per ton;

(3.) Two per cent. where such value exceeds £3 but does not exceed £4 per ton; and

(4.) Two and a half per cent. where such value exceeds £4 per ton.

7. The royalty on all gold and silver produced between the 20th day of August, 1897, and the date of the license shall be payable by the licensee when making the first payment, as hereinafter prescribed, in respect of the gold or silver produced subsequent to such date.

8. The royalty on all gold and silver produced subsequent to the date of the license shall be payable by the licensee on or before the seventh day of each calendar month after such date, each such payment being in respect of the gold and silver so produced during the then last-preceding calendar month.

9. For the purpose of enabling the amount of the royalty to be ascertained and computed, each licensee shall, on or before the due date of each periodical payment in respect of royalty, furnish to the Receiver of Gold Revenue for the mining district wherein the license is issued a return in the form numbered 3 in the Schedule hereto, or to that effect, showing for each such period the total number of tons of quartz or other ore treated, the total number of ounces of gold and silver respectively produced, the value thereof, and the amount of royalty payable in respect thereof.

10. Such return shall be verified by the statutory declaration of the licensee, or some responsible person competent to speak to the facts.

11. All royalty shall be payable to the Receiver of Gold Revenue for the mining district wherein the license is issued.

12. If any person commits any breach of any of the foregoing regulations, then, in addition to any other penalty or punishment to which he thereby exposes himself, he, and in the case of a company the manager and every director thereof, are severally liable to a penalty not exceeding £5.

13. The Receiver of Gold Revenue for the district wherein any license is issued shall, not later than the 10th day of January, April, July, and October in each year, transmit to the Minister of Mines at Wellington a statement, in the form numbered 4 in the Schedule hereto, or to that effect, of all royalties, penalties, and other moneys received by him under the said Act during the previous three months.

As witness the hand of His Excellency the Governor, this twenty-sixth day of January, one thousand eight hundred and ninety-eight.

W. C. WALKER,  
For Minister of Mines.

*Amended Regulations under "The Cyanide Process Gold-extraction Act, 1897."*

RANFURLY, Governor.

In pursuance and exercise of the powers and authorities conferred upon me by "The Cyanide Process Gold-extraction Act, 1897," I, Uchter John Mark, Earl of Ranfurly, the Governor of the Colony of New Zealand, do hereby amend the regulations made by me under the aforesaid Act on

the twenty-sixth day of January, one thousand eight hundred and ninety-eight, by revoking clause six thereof, and substituting in lieu thereof the following clause:—

6A. The royalty shall be payable on the following graduated scale, according to the value of all gold and silver produced from each ton of quartz or other ore in the mine wherein the said patent rights are used or employed, that is to say,—

- (1.) One and a half per cent. of such value where such value does not exceed £3 per ton ;
- (2.) Two per cent. where such value exceeds £3, but does not exceed £4 per ton ; and
- (3.) Two and a half per cent. where such value exceeds £4 per ton.

As witness the hand of His Excellency the Governor, this seventh day of February, one thousand eight hundred and ninety-eight.

WM. HALL-JONES,  
For Minister of Mines.

The following additional Regulations have also been gazetted since the expiry of the year ended 31st March, 1898:—

*Additional Regulations under "The Cyanide Process Gold-extraction Act, 1897."*

RANFURLY, Governor.

In pursuance and exercise of the powers and authorities conferred upon me by "The Cyanide Process Gold-extraction Act, 1897," I, Uchter John Mark, Earl of Ranfurly, the Governor of the Colony of New Zealand, do hereby make the following regulations in addition to the regulations made by me under the aforesaid Act on the twenty-sixth day of January, one thousand eight hundred and ninety-eight.

1. Any licence may be cancelled by the Warden for breach of any of the provisions of the aforesaid Act or regulations.

2. At any time, upon payment of all royalty, and upon due compliance with all the provisions of the aforesaid Act and regulations up to the date of surrender, any licensee may surrender his license to the Warden for cancellation, and the Warden may cancel the same.

3. The cancellation of a license shall in no case release the licensee from his liability in respect of any royalty, penalty, or obligation under the aforesaid Act or regulations up to the time when the license is cancelled.

As witness the hand of His Excellency the Governor, this tenth day of June, one thousand eight hundred and ninety-eight.

A. J. CADMAN,  
Minister of Mines.

**SUNDAY LABOUR IN MINES.**

The Act providing that no labour except that which is imperatively necessary should be employed in mines on Sundays came into operation on the 18th December, 1897, and generally may be said to have acted beneficially. Since the Act has been in force permits for 445 men have been granted, 349 in the northern, thirty-six in the West Coast, and fifty-eight in the southern mining districts. At date of writing there are fifty-six permits in force, allowing the employment of 311 men. The fact that there has been only one—that of the Waihi Company—appeal to the Warden against the decisions of the Inspectors of Mines in granting permits for fewer men than were applied for would indicate that these officers have used their powers with intelligence and discretion. The following schedule shows the number of men employed and the companies employing them:—

**SCHEDULE OF PERMITS ISSUED BY INSPECTORS OF MINES.**

Date of Issue.	Number of Men.	Issued to.	Date of Expiry.
<i>Southern Mining District.</i>			
30/12/97	6	Kaitangata Railway and Coal Company...	Till notified.
4/1/98	4	Shag Point Colliery ...	"
8/1/98	2	Fernhill Coal-mine ...	"
24/1/98	3	Barewood Quartz Mining Company ...	"
25/1/98	1	Moonlight Sluicing Company ...	"
3/2/98	5	Morning Star Gold-mining Company ...	"
8/2/98	1	Allandale Coal Company ...	"
16/2/98	15	Round Hill Mining Company ...	"
2/3/98	4	Golden Site Extended Gold-mining Company ...	"
2/3/98	2	Achilles Goldfields (Limited) ...	"
1/4/98	3	Kildare Hill (St. Bathans, J. Ewing) ...	"
1/4/98	1	Vinegar Hill " " ...	"
1/4/98	2	Shepherd's Flat " " ...	"
1/4/98	2	Cambrian's " " ...	"
1/4/98	1	Matakanui " " ...	"
1/4/98	1	Bald Hill Flat " " ...	"
1/4/98	3	Hercules, Roxburgh " " ...	"
13/4/98	2	Freeman's Coal Company ...	"
58			

## SCHEDULE OF PERMITS ISSUED BY INSPECTORS OF MINES—continued.

Date of issue.	Number of Men.	Issued to.	Date of Expiry.
<i>Northern Mining District.</i>			
1/1/98	6	Woodstock Gold-mining Company ...	31st March, 1898.
1/1/98	4, and 3 occasionally	New Zealand Talisman Gold-mining Company ...	"
1/1/98	6	New Zealand Crown Mines (Limited) ...	"
1/1/98	36	Waihi Gold-mining Company ...	"
1/1/98	4	Waihi Gold-mining Company (cyanide-vats) ...	"
1/1/98	21	Waitekauri Gold-mining Company ...	"
1/1/98	7	Waihi-Silverton Extended Gold-mining Company ...	"
14/1/98	3	Waihi Consolidated ...	"
15/1/98	4	Waihi Union ...	"
15/1/98	4	Ohinemuri Syndicate ...	"
26/1/98	14	Kauri Freehold Gold Estates ...	"
26/1/98	7	Moanataiari Gold-mining Company ...	"
25/1/98	4	Fortuna (Hauraki) Gold-mines (Limited) ...	"
25/1/98	6	New Zealand Jubilee Mine ...	"
28/1/98	6	Komata Reefs ...	"
18/3/98	6	Waihi Gold-mining Company (Victoria Mill) ...	31st December, 1898
31/3/98	4	Big Pump ...	"
31/3/98	2	Deep Sinker ...	"
31/3/98	6	Woodstock ...	"
30/3/98	3	Fortuna Hauraki ...	"
30/3/98	3	Waihi Consolidated ...	"
28/3/98	12	Waihi ...	"
28/3/98	4	Hauraki Main Lodes ...	"
28/3/98	7	Talisman ...	"
30/3/98	21	Waitekauri ...	"
1/4/98	6	Hauraki South ...	"
1/4/98	10	Waihi-Silverton Extended ...	"
2/4/98	2	Moanataiari ...	"
2/4/98	6	Scotty's Hauraki ...	"
2/4/98	9	Golden Pah of Hauraki ...	"
2/4/98	6	Royal Oak of Hauraki ...	"
2/4/98	12	Hauraki ...	"
2/4/98	9	Kathleen ...	"
2/4/98	9	Kapanga ...	"
5/4/98	10	Waihi ...	"
5/4/98	4	Whangamata Proprietary ...	"
5/4/98	4	Ohinemuri Syndicate ...	"
5/4/98	3	Welcome Find ...	"
28/3/98	6	Komata Reefs ...	"
6/4/98	4	Hauraki North ...	"
6/4/98	5	Union Waihi ...	"
6/4/98	2	Blagrove's Freehold ...	"
12/4/98	3	Kathleen Crown ...	"
6/4/98	14	Kauri Freehold Gold Estates ...	"
19/4/98	7	Taupiri Extended Coal Company ...	"
29/4/98	7	Blagrove Freehold Gold-mining Company (Limited) ...	"
20/5/98	11	New Zealand Crown Mines (Limited) ...	"
	849		
<i>West Coast Mining District.</i>			
25/3/98	2	Westport-Cardiff Coal Company ...	24th June, 1898.
31/3/98	16	Brunner ...	30th September, 1898.
13/4/98	5	Progress Mines ...	13th October, 1898.
15/4/98	6	Denniston Mine ...	15th October, 1898.
9/5/98	4	Big River ...	7th November, 1898.
25/5/98	3	Granity Creek Mines ...	23rd November, 1898.
	36		

## PROVISIONAL WARRANTS.

The issue of provisional warrants to act as mine-managers has been largely taken advantage of, and the legislation provided by the Amendment Act, 1896, enabled the owners of mines to employ capable men who otherwise did not possess the necessary qualification to manage their mines. The number of mining companies that sprung into existence has now become very much curtailed, and the necessity, therefore, for the issuing of warrants is past, as the number of managers holding first-class certificates is in excess of the present demand. The provision that the Board of Examiners may issue certificates to holders of warrants will enable several old and skilful managers to have the opportunity of availing themselves of the concessions which no doubt the Legislature had in view when the Act was framed.

## TESTING PLANTS FOR QUARTZ PROSPECTORS.

In view of the need of a ready opportunity of testing and ascertaining the value of quartz lodes situated at a distance from mining centres, the Government has decided on the erection of small plants for that purpose. It is probable that one of those plants will be erected at Mahakirau, in the Mercury Bay portion of the Hauraki district. The following is a copy of the regulations to be observed :—

## REGULATIONS FOR THE ERECTION AND WORKING OF SMALL TESTING PLANTS FOR THE USE OF PROSPECTING ASSOCIATIONS.

1. When the plant has been erected by the Mines Department it will be handed over to a responsible prospecting association, to be approved by the Minister of Mines, to be held in trust for the Government.
2. The person to be appointed by the prospecting association to take charge of the plant must be approved by the Inspector of Mines of the district.
3. The charges for crushing will be fixed by the Minister of Mines, after consultation with the prospecting association, at such rates as will merely cover the wages of the man in charge and provide for working-expenses and keeping the plant in repair.
4. Should the amounts received for crushing at any time not be sufficient to keep the plant in repair and pay the wages of the man employed, any deficiency must be paid by the prospecting association.
5. The cost of obtaining quicksilver, and anything of a kindred nature required for the treatment of the ores, must be borne by the association; but a reasonable percentage of loss will be considered a fair charge on working-expenses.
6. No "cleaning-up" will be allowed to take place except in the presence of representatives of the persons or companies for whom crushing is done unless they first give their written consent to the contrary.
7. Payment for crushing must be made before the gold and silver obtained is handed over, otherwise the cost will be deducted from such gold and silver.
8. The man in charge will be required to furnish a weekly report to the Inspector of Mines of the district, showing—
  - (a.) Number of hours the battery has been employed.
  - (b.) Total number of tons of ore crushed.
  - (c.) Names of persons for whom ore has been crushed, and the number of tons for each person.
  - (d.) Names of claims or licensed holdings for which crushing has been done.
  - (e.) Breakage or damage (if any) done to plant.
  - (f.) Estimated cost of repairing the same.
9. The man in charge will also be required to furnish a monthly or quarterly return of receipts and expenditure in connection with the plant.
10. The Inspector of Mines must report quarterly on the condition of the plant.
11. Arrangements must be made between the association and the Inspector of Mines whereby the battery cannot be monopolized for too long a period by any one party of prospectors.
12. Should any dispute arise under these regulations it shall be decided by the Inspector of Mines for the district.

## WATER-CONSERVATION.

Mr. Perham, Engineer for Water-conservation, in consultation with Mr. Alex. Aitken, C.E., of Kumara, inspected the site of the proposed Eweburn Dam, and a joint report has been forwarded finally recommending the suitability of the ground, as previously ascertained by borings, &c., for the erection of the dam. Mr. Perham has also since been through the Hauraki Goldfields on business connected generally with water-conservation, and will furnish reports on the Thames Low-level Water-race and domestic water-supply for the mining townships of Coromandel, Karangahake, Waihi, Waitekauri, and Te Aroha, the last combining electric lighting of the domain and the new bath-houses.

### "NEW ZEALAND MINES RECORD."

The publication of this journal, which commenced in August, 1897, has been continued monthly by the Mining Bureau. The "Record" is widely distributed, and copies are frequently sought after by outside capitalists and by the mining journals in England, America, South Africa, and the Australian Colonies. Some of the reports which have appeared have been printed separately and forwarded to the Agent-General and to the parties more particularly interested; while the article "Explosives in Coal-mines" and the "Prospecting Regulations" have been printed in pamphlet form and hundreds of copies sent for distribution to the Inspectors of Mines and Mining Registrars throughout the colony. Special articles on improved mining appliances and metallurgical processes, which appear from time to time, afford information to those engaged in mining in this colony as to the latest and best methods in use for economical milling and gold-extraction in other countries where mining is carried on.

### AID TO DEEP-LEVEL MINING.

The substantial aid given by the Mines Department from votes allocated for furthering deep-level mining has been the means of aiding and carrying on various works to that end in the Hauraki district of the Auckland Goldfields.

The Hauraki Properties Company, at the Thames, has completed the expenditure of their proportion of the cost of machinery and sinking at the Queen of Beauty shaft, and the full amount of the subsidy authorised towards that work, viz.: £25,000 has now been expended, £21,270 15s. having been paid during the past year.

The deep-level tunnel at the Jubilee Mine, Waitekauri, has only been extended during the year to such an extent as to be entitled to a further payment from the vote on that account of £61 4s.

The Kapanga Company, at Coromandel, has been subsidised to the amount of £503 6s. 11d.

The total expenditure from the different votes has been £21,835 5s. 11d.

### GEOLOGICAL EXAMINATIONS.

In the season of 1897-98 Mr. McKay, the Government Geologist, was engaged during December in making an examination of the reef deposits of Kirwan's Hill and the adjacent ranges on the west flank of the Victoria Mountains, between Larry's Creek and the Waitahu or north branch of the Inangahua River. His conclusions are that the rocks of the district examined are the same as those that extend from the eastern sources of Rainy Creek to Big River, and that the rich quartz found on the surface of the southern slope of Kirwan's Hill is derived from reefs in the neighbourhood, which will probably be found along the western boundary of the Lord Brassey Claim.

After the New Year the survey of the Hauraki Goldfields on the Cape Colville Peninsula was continued during January. At the beginning of February Mr. McKay went to Whangaroa, north of the Bay of Islands, for the purpose of examining the outcrops of copper-ore occurring in the Valley of the Pupuki River, from which examination it would appear that there are considerable bodies of ore, some of which is of high quality, but as yet very little has been done in the way of proving the importance and permanence of the supposed lodes.

At the same time an examination was made of the western part of the Kawakawa Coalfield, in order to ascertain the probabilities of success of recent efforts to reach coal by boring on that part of the field lying to the south of Scoria Flat. Mr. McKay does not think that the operations of the Russell Syndicate will be attended with success.

On the Cape Colville Peninsula work up to April was chiefly confined to a belt of country following the Ohinemuri Valley from Karangahake to the sea, on the east coast, south of Matakura. Along this belt of country the geological features were studied with care, and a large collection of rocks and minerals was made, illustrating conditions at the surface and in the various mines. One important result of work in this southern part of the goldfields is the proof that in some of the mines rhyolite rock forms the walls of the lode and spherulitic rhyolite has been found associated with the older group of volcanic rocks on the higher part of Karangahake Mountain.

Te Puke Goldfield was visited, and a general similarity of the rocks and quartz lodes to those of the southern part of the Hauraki Goldfields was made out, yet Mr. McKay finds that there is no direct connection between the south continuation of the Cape Colville ranges and those of the Te Puke Goldfield.

In the Thames field Mr. McKay's work was confined to the district between Tararu and Hape Creeks, and to an investigation of the disposition of the various classes of country found on that field, an investigation of the effects of the Moanataiari fault or slide, and of other slides on the field, and the identity or otherwise of the country on each side of the main faults.

### DIAMOND DRILLS.

The application of diamond drills for the purpose of boring to test the deeper levels in the gold-mining districts of the colony has not up to the present proved to be a success. The varying nature

of the strata through which the bore has to be taken has militated against the profitable use of this apparatus. The drill owned by the department is still in use at the Kapanga Mine, and has done useful work where the strata was of a suitable nature for its employment. Diamond drills have in the past been successfully used in prospecting the coal-measures at Kawakawa and Kamo.

Applications for the hire or loan of drills for prospecting for coal having been frequently received, it may be well to state that the department is not at present in possession of any drills or rods suitable for this class of operations.

#### FATALITIES IN MINES.

Exclusive of the dredging industry, the particulars in respect to which are given elsewhere, nine fatal accidents occurred during the year. Of these, three happened in the northern, four in the West Coast, and two in the southern mining district. Inquiries into the cause and circumstances connected with each of these fatalities were instituted, and from the reports submitted thereon it has been ascertained that in no case was negligence of due precaution the cause of the accident.

The number of men employed in quartz and alluvial mining was 14,198, and the rate per thousand of fatalities was 1, a very moderate percentage when the inevitably dangerous nature of the miner's occupation is taken into consideration.

A number of accidents of more or less gravity occurred during the year, but in each case inquiry has exonerated the officials in charge of the mine from blame.

#### ACCIDENTS ON DREDGES.

The number of men employed on the dredges in the southern mining district is estimated at 420. The number of fatalities which occurred during the year was no less than five, being at the rate of 11.9 per thousand. The circumstances under which this branch of the gold-mining industry is carried on are such that men are necessarily exposed to considerable risk to life and limb, and it was accordingly deemed advisable to draw the attention of dredge-owners to the provisions of section 29 of "The Mining Act Amendment Act, 1895," with reference to the precautions to be observed for the safety of those engaged in this class of work. The following circular letter was therefore addressed to the owners and managers of dredges, and it is anticipated that, with increased attention to the safeguards therein referred to, the mortality during the ensuing year will be materially lessened:—

I have to direct your attention to section 29 of "The Mining Act Amendment Act, 1895," which provides that—(1.) Every dredge used for mining purposes shall at all times be equipped with life-saving appliances to the satisfaction of the Inspector, and shall have at least one suitable boat. (2.) Every manager who fails or neglects to comply with the provisions of this section is liable for each offence to a penalty not exceeding twenty pounds.

In pursuance of which, notice is hereby given that all dredges must be equipped with safety appliances as under:—Two life-buoys and two light lines, to be hung in conspicuous places within easy reach fore and aft; two boat-hooks, and one boat containing a life-buoy, line, and boat-hook.

If working in or adjacent to a current, the following additional appliances must be provided, viz.: Life-belts to be worn by each member of the crew of any boat while engaged in shifting the lines; one extra boat, containing a life-buoy, line, and boat-hook.

Attention is directed to the practice of men stepping on buckets when in motion for the purpose of crossing the well. This is dangerous and must be strictly prohibited; and, where practicable, the well should be protected by a movable fence, or covered over as much as possible with a platform in, say, 2 ft. sections. Where neither method is practicable, a gangway at least 2 ft. 6 in. wide and fitted with substantial hand-rails at each side is to be used for crossing the well.

Where coal, &c., is not brought on board by boats, a gangway of sufficient length, not less than 2 ft. 6 in. wide, and fitted with a substantial hand-rail at each side must be provided and used, as the practice of carrying coal on board a dredge across an unprotected plank or gangway is dangerous.

On dredges which are not entirely covered in, the sides of the uncovered portion of the hull must be fitted with stanchions, not more than 8 ft. apart, and two substantial rails or tightly stretched wires or chains, the lower rail, wire, or chain not being more than 10 in. above the deck, and these may be made movable for the purpose of taking coal, &c., on board, but are to be kept in position at all other times, as the practice of leaving certain portions of the hull unprotected is dangerous.

#### SLUDGE-CHANNELS.

The following list shows the rivers throughout the various mining districts which have been proclaimed as watercourses into which tailings and mining *débris* may be discharged, and the dates from which the Proclamations have taken effect. The supplementary schedule shows those rivers and creeks concerning which the required notice of intention to proclaim has been gazetted, but in respect to which, owing to various causes, Proclamations have not as yet been issued:—

## SCHEDULE OF RIVERS PROCLAIMED AS WATERCOURSES FOR THE DISCHARGE OF TAILINGS.

Name of River.	Date from which Proclamation takes Effect.	Name of River.	Date from which Proclamation takes Effect.
Maerewhenua ...	June 24, 1891	Tauperikaka ...	June 1, 1895
Teremakau ...	Aug. 2, 1888	Waita ...	" 1, 1895
Arahura ...	" 2, 1888	Haast ...	" 1, 1895
Nelson Creek ...	Oct. 10, 1894	Okuru ...	" 1, 1895
Parapara ...	June 1, 1894	Turnbull ...	" 1, 1895
Little Wanganui, Karamea ...	" 1, 1894	Hapuka ...	" 1, 1895
Granity Creek, Oparara ...	" 1, 1894	Waiototo ...	" 1, 1895
Karamea ...	" 1, 1894	Arawata ...	" 1, 1895
Little Wanganui ...	" 1, 1894	Smoothwater ...	" 1, 1895
Oparara ...	" 1, 1894	Humming Cove Creek ...	" 1, 1895
Granity Creek ...	" 1, 1894	Dandy Creek ...	" 1, 1895
Duffer's Creek ...	Mar. 18, 1895	Stafford ...	" 1, 1895
Donnelly's Creek ...	July 1, 1895	Cascade ...	" 1, 1895
Kanieri River ...	Oct. 10, 1894	Hope ...	" 1, 1895
Totara (Ross) ...	July 1, 1895	Spoon Creek ...	" 1, 1895
Matakitaki ...	June 1, 1895	Fork Creek ...	" 1, 1895
Half-ounce Creek ...	July 1, 1895	Gorge Creek ...	" 1, 1895
Black Ball Creek ...	June 1, 1895	Longridge Creek ...	" 1, 1895
Brandy Jack's Creek ...	July 1, 1895	Hacket Creek ...	" 1, 1895
Ford's Creek ...	June 1, 1895	Waihou, or Thames ...	July 10, 1895
Duffer's Creek (Ross) ...	July 1, 1895	Ohinemuri ...	" 10, 1895
Bradshaw's Creek ...	June 1, 1896	Kuaotunu Creek ...	" 10, 1895
Red Jack's Creek ...	May 10, 1897	Doctor's Creek ...	" 10, 1895
No Town Creek ...	" 10, 1897	Kaituna ...	Aorere River Sept. 23, 1897
New River ...	" 10, 1897	Staunton's Creek ...	
Mikonui ...	June 1, 1895	Aorere ...	Dec. 23, 1897
Waitaha ...	" 1, 1895	Moonlight Creek ...	Mar. 1, 1896
Wanganui ...	" 1, 1895	Baxter's Creek ...	" 1, 1896
Poerua ...	" 1, 1895	Caledonian Creek ...	" 1, 1896
Wataroa ...	" 1, 1895	Deep Creek ...	June 1, 1897
Waitangitaona ...	" 1, 1895	Wangapeka River ...	April 7, 1898
Waitangirotu ...	" 1, 1895	Nile, or Waitakere ...	Dec. 23, 1897
Okarito ...	" 1, 1895	Four-mile, or Tikipihi ...	" 23, 1897
Waiho ...	" 1, 1895	Hauhau, or Three-mile ...	" 23, 1897
Totarakaitorea ...	" 1, 1895	Wakamarina ...	" 23, 1897
Totara ...	" 1, 1895	Wareatea ...	Aug. 1, 1898
Alpine Creek ...	" 1, 1895	Waimea ...	" 1, 1898
Omoera ...	" 1, 1895	Maruia ...	" 1, 1898
Waikukupa ...	" 1, 1895	Wharariki ...	" 1, 1898
Waihapi Creek ...	" 1, 1895	Mangamangarakau ...	" 1, 1898
Hauraki Creek ...	" 1, 1895	Big River ...	" 1, 1898
Waikohai Creek ...	" 1, 1895	Kahurangi ...	" 1, 1898
Weheka (or Cook's) ...	" 1, 1895	Seal Creek ...	" 1, 1898
Oinetamatea ...	" 1, 1895	Waimori ...	" 1, 1898
Karangarua ...	" 1, 1895	Waterfall Creek ...	" 1, 1898
Manakaiiau ...	" 1, 1895	Heaphy ...	" 1, 1898
Makawihu ...	" 1, 1895	Kararoa ...	" 1, 1898
Mahitahi ...	" 1, 1895	Wekakura ...	" 1, 1898
Oinemaka ...	" 1, 1895	Kohai-hai ...	" 1, 1898
Paringa ...	" 1, 1895	Blackwater Creek ...	" 1, 1898
Moeraki ...	" 1, 1895	Ngakawhau ...	" 1, 1898
Wakapohia ...	" 1, 1895	Dee Creek ...	" 1, 1898
Kotokakorakota ...	" 1, 1895	Coal Creek ...	" 1, 1898

## SUPPLEMENTARY SCHEDULE.

Waipori	Takaka	Anatori
Noble's	Hokitika	Turinawiji
Orwell	Stillwater Creek	Anaueka
Doctor's Creek	Liverpool Davy's Creek	Raukawa
Coal Creek	Orawaiti	Mokihinui
German Gully Creek	Dead Man's Creek	Rough, or Brown's Creek
Callaghan's Creek	Te Hapu Creek	Landing Creek
Totara River, Charleston	Waitaki Creek	Soldier's Creek
Saltwater Creek, or Paroa River	Ngutuhi Creek	Walker's Creek
Boatman's Creek	Paturau	Black-sand Creek
Baton River	Blow-hole Creek	Big Kapitea Creek
Ahaura River	Punipawa Creek	Little Kapitea Creek
Main Totara River	Sandhills Creek	Pelorus River
Branch Totara River	Slaty Creek	Grey River.
Anatoki	Malone's Creek	



## COAL-MINING.

## NORTH ISLAND.

The coal-mining industry, especially in the northern portion of Auckland District, has not been progressive, the output from the various mines showing a general falling-off; whilst in the southern district the mines in Waikato, as well as the Mokau Coal-mine, show an increase; the total increase for the whole district being 1,473 tons.

The New Bay of Islands Mine, at Kawakawa, has given an output 2,833 tons less than that of last year, and if no new discovery is made the quantity produced last year will not again be exceeded in any one year.

*Hikurangi Mines.*—The Hikurangi Coal Company still maintain a steady output. 30,663 tons were produced, being an increase of 2,683 tons compared with last year. The West Bryan's Mine produced only 2,142 tons, being a decrease for the year of 7,397 tons, whilst the Phoenix Mine produced 5,026 tons, giving an increase of 2,926 tons. A new mine is being opened close to the railway which will soon be in a position to produce coal. No difficulty would be experienced in maintaining a large output from this district if the demand should increase.

The output of the Ngunguru Mine for the year was 16,248 tons, being a decrease of 3,985 tons.

The Kamo New Mine, at Whangarei, still continues to produce coal in small quantities, chiefly for local consumption.

In the Waikato district there has been a general increase in the output of coal, the Taupiri Extended Company alone producing 33,066 tons, being an increase of 4,925 tons over the output of the previous year. Although there has been a slight falling-off in the Waikato Company's return, the Taupiri Reserve Company's mine shows an increase on the output of last year of 210 tons. A very large output of coal of this class could be maintained from this district, especially as Ralph's Mine, which has been closed for the past five years, is about to be reopened by a new company.

*Mokau Mine.*—This mine is being energetically opened up, and, as the company has now a steamer capable of carrying 120 tons, the trade has increased. The output of coal for the year was 3,448 tons, an increase of 1,205 tons over that of the previous year.

## MIDDLE ISLAND.

A limited amount of coal has been put out from the Pakawau and Enner Glyn Mines, at Collingwood and Nelson respectively.

The Mokihinui Mine was closed down during the year.

The Westport Cardiff Mine has produced 54,280 tons, being an increase of 13,849 tons over the output of the preceding year.

The Granity Creek Mine has produced 59,240 tons, being an increase of 38,697 tons over the yield of last year.

The Coalbrookdale Mine shows a decrease of 6,599 tons, the output for the year being 184,376 tons.

The mines at Longford, Boatman's, and Reefton continue to produce small quantities of coal for local requirements.

In the mines in the Greymouth district, there was a falling-off in the Blackball of 2,688 tons, and in the Brunner Mine of 6,526 tons.

In the West Coast and Nelson districts the increase in the output for the year was 26,115 tons.

In the Canterbury District there was a decrease of 323 tons in the Springfield Mine, the output for the year being 2,357 tons. The Homebush Mine yielded 3,718 tons, being an increase of 554 tons over the output of the previous year. The Mount Somers Mine produced 2,818 tons, an increase for the year of 800 tons. The total produce of coal in this district for the year was 13,710, showing an increase of 1,893 tons.

In North Otago the Shag Point Mine yielded 23,334 tons, an increase of 2,237 tons on the output of last year. The Allendales Mines yield was 11,635 tons, showing an increase of 180 tons. The total quantity of coal produced in this district was 39,015 tons, the total increase for the year being 2,176 tons.

In the South Otago district the Fernhill Colliery produced 7,191 tons, an increase of 754 tons. Freeman's Mine yielded 7,824 tons, also an increase of 274 tons over the yield of the preceding year. The Walton Park Green Island Collieries produced 11,554 tons, a decreased output of 5,058 tons. The Kaitangata Mines return for the year was 92,914 tons, being an increase of 20,378 tons on the output of the previous year. The Castle Hill Colliery only produced 472 tons, a decrease of 12,253 tons as compared with the return of last year. Conical Hills Mine produced 2,006 tons, a decrease of 54 tons. For the whole district 148,059 tons was produced, being an increase of 10,769 tons.

In the Central Otago district the yield from the various mines was 25,218 tons, being an increase of 5,533 tons. The demand for coal to supply the dredges on the various rivers caused increased activity in the pits in this district.

In Southland the Nightcaps Mine was the largest producer, 22,792 tons being obtained, an increase of 5,887 tons. The total yield for the whole district was 43,704 tons, or a decrease of 97 tons.

The total increase in the output of coal for the colony during the year was 47,862 tons, the output for the year 1896-97 being 792,851, and that of the present year 840,713 tons.

## ACCIDENTS IN COAL-MINES.

During the year four fatal accidents took place in coal-mines. Of these, one occurred in the North Island, and three in the southern district, there being no fatalities recorded from the West Coast district. The number of men engaged in coal-mining in the colony being 1,912, the rate of fatal accidents for the year was 2.092 per thousand. The usual number of serious and minor

casualties occurred during the year, the sufferers receiving aid from the Coal-miners' Relief Fund or the District Sick and Accident Funds in each case.

#### HUNT COAL-CRACKER.

Many engineers being of opinion that bituminous coal can be more advantageously used in furnaces, and more perfect combustion secured, when the fuel is broken into small lumps, my attention has been directed to the Hunt Coal-cracker, patented by the C. W. Hunt Company, of New York, from the description of which it appears that the machine secures the desired end—viz., to crack, but not to crush, the large lumps of coal into pieces of a smaller and more suitable size for use in the furnaces of stationary or locomotive engines.

#### MASUT.

In forwarding an extract from *Chambers's Journal* on "masut" recently, the Acting-Inspector of Mines for Otago and Canterbury called attention to the fact that the only coal really suitable for ocean-steamers is that of the West Coast district, and that, so far as Canterbury, Otago, and Southland are concerned, they are dependent on brown coals and lignites; and the same may be said to some extent of the North Island. In the working of our best brown coals there is a good deal of waste slack for which there is no market, and it had often occurred to him that this might be used for the production of oil-fuel. When this slack is left in the mines it generally causes underground fires, and when banked up at the surface it burns away, spontaneous combustion almost invariably taking place. If "masut" or its equivalent could be made from our lignites and brown coals cheaply enough for use on steamers, locomotives, &c., it would prove a great help to the Otago and Southland Districts, and enhance the value of our mineral deposits. In addition to oil-fuel there would, he thinks, be a fair yield of ammoniacal liquor, from which sulphate of ammonia, which is a valuable fertiliser, could be made. In Central Otago there are oil-shales underlying thick beds of lignite, yielding a good percentage of crude oil; also at Orepuki, in Southland, but not so good as that from Central Otago. The following is the extract referred to:—

"For many years in the distillation of raw petroleum there has been a by-product called masut, for which no use could be found. It could not be turned into lubricating oil, or vaseline, or any marketable commodity; but it burns with a steady, clean flame, and gives out a very great heat. In consequence, it has been used extensively in Russia for firing steam-boilers. It has been used on the railways, and in steamships, and in manufactories; but the great difficulty lay in inventing a suitable furnace to burn it in. It is a dark-brown oily liquid, and, of course, the furnaces used for coal are of no use. But at last this difficulty has been overcome. By employing steam to blow it into the furnace, on the principle of the Lucigen light, it can now be used without difficulty. The Russian navy and the Italian navy have used it for some years with success. During the years 1895 and 1896 the German navy has carried on a series of experiments for testing the value of the new fuel, and the results of these experiments are now published. Germany has no great oil-wells like Russia and America, but she has coalfields. A cheap kind of brown coal found in Saxony has been used for the manufacture of masut, and a new and flourishing industry has in consequence been started in that province. It was with this brown coal (masut) that the experiments were made which have been so successful. Masut is said to have many advantages over coal. The first claimed is that it is much cheaper than good coal—as much as 40 to 50 per cent. cheaper. It is difficult to see how it can be produced so very cheaply, unless it be that the materials from which it is made being practically worthless it can be sold at the cost of production. The second advantage claimed is that it is a better heat-raiser. The result of a comparison of masut with the best steam-coal showed a result in favour of masut as a heat-raiser in the proportion of 17 to 10. That is more than half as good again; and, even supposing the same good results could not always be obtained in ordinary cases, we may be safe in saying that masut is at least 20 per cent. better as a heat-raiser than coal. The third advantage claimed is that it burns with a steady, brisk flame, and requires scarcely any stoking; in fact, the lighting of our engine fires may probably become as simple as the lighting of the gas, and likely also to require as little attention. The next point in favour of masut is that it is much better adapted for raising heat in the newer types of steam-boilers than coal. Steam can be got up quicker by it than by coal, and in consequence of its greater heating-power a higher pressure of steam can be kept up, and a greater amount of work got out of the machinery.

"The experiments in the German navy were made during the first year in a torpedo-boat, and afterwards in cruisers and battleships; and this is a point of great importance from a naval point of view. To be able to get up steam quickly and keep up a high pressure are points of vital importance in the navy in time of war. Another point claimed for masut, which weighs heavily in the minds of naval officers, is that it gives out no smoke. The torpedo-boat, and even the battleship, can get up full steam on the shortest notice, and no sign of it can be seen in the sky. In warfare this is of immense importance. At present our swift steamers leave behind them a long trail of smoke across the sky, and the enemy, even below the horizon, can be detected by the black canopy of soot. Henceforth it will be different. A whole fleet might come within striking distance of our shores and remain unnoticed. We have introduced smokeless powder; it may be necessary, if other nations adopt it, that we also adopt smokeless fuel."

#### KAURI FREEHOLD GOLD ESTATES.

The following account of the Kauri Freehold Gold Estates Company's Mine and works from Mr. Alexander Montgomery, Superintending Engineer for the company, did not reach me in time to be included in my report:—

The freehold property acquired by the Kauri Freehold Gold Estates (Limited) comprises, roundly, 86,000 acres, including the following blocks: Opera, Whangapoua, Maungatapu, Horongo-

herehere, Kaeaea, Hikutawatawa, Te Ranga, Waitekuri, Opitonui, one-half of Wairoa, Owerā, Otanguru, Opou, Moewai, Ngarahutunoa, Weiti No. 1, Whakau, and Kaimarama, all situated near Whangapoua and Whitianga Harbours; Willis's and Graham's Blocks, near Tairua Harbour; and Matakītaki and Taparahi No. 1 Blocks on the upper portion of the Tairua River basin.

Prospecting operations have been vigorously carried on by the company since its inception, and gold has been proved to exist more or less all over the property, the main exceptions being the Kaimarama Block, which is mainly composed of rhyolitic rocks, and Weiti No. 1 and Whakau, which are swamps of recent geological formation, really slightly elevated portions of the bottom of Mercury Bay. Gold-bearing reefs of considerable size and value have been discovered on the Opera, Te Ranga, Waitekuri, Opitonui, Owerā, Otanguru, and Ngarahutunoa Blocks, also at Taparahi No. 1, and traces of gold found on all the other blocks except the three above mentioned. The prospecting has demonstrated the generally auriferous character of the company's property, and gives great reason to believe that many portions of it will contain valuable mines.

The principal workings of the company are on the Opitonui Block, about five miles inland from the Whangapoua Wharf, with which they are now connected by a narrow-gauge railway. Here a large block, containing 810 acres, has been surveyed off into nine square special claims of 90 acres each, the whole block being known as the Castle Rock Consolidated Mines Block. This area is full of reefs, more than a dozen of which have been tested to some extent, and nine of which have been proved to carry gold in notable quantities. These are known as—(1) The Maiden reef, (2) the Carvill reef, (3) the Lanigan's and Hilda reef, (4) the Hilda Cross reef, (5) the Zealandia No. 1 reef, (6) the Zealandia No. 2 reef, (7) the Australasia reef, (8) the Opitonui reef, (9) the Golden Hill reef. The principal mining works are on the Maiden, Carvill, Lanigan's and Hilda, and Opitonui reefs. There has been a good deal of work done on the others, and some very fair auriferous quartz has been obtained from them, but they must still be regarded as in the prospecting stage of development.

The Maiden reef is a strong body of quartz running north-westerly and underlying to the south-west. Two tunnels have been driven on it, No. 1 being 378 ft. in length, and No. 2 697 ft. A fine chute of payable ore, 571 ft. in length, has been proved in the No. 2 tunnel, and the reef is from 2 ft. to 10 ft. in width. Over 1,500 tons of good ore have been saved during the driving of this tunnel, without any stoping. The gold is free but very fine, requiring the use of the cyanide process for its extraction. A branch tramway has been made from the main line, 39 chains in length, to the mouth of a third adit, about 70 ft. below No. 2, which will be called No. 3 tunnel. Machinery for a main winding-shaft has also been erected, and shaft-sinking has begun. The winding-engine is of Tangye's couple-gear pattern, with two cylinders 8 in. by 16 in., and winding-drums 4 ft. in diameter, and takes steam from a Tangye's 25-horse power (nominal) steel Cornish boiler, which also supplies steam to a Tangye's 14 in. by 7 in. by 24 in. vertical "special" sinking-pump, capable of raising 9,800 gallons of water per hour from a depth of 300 ft.

The Carvill reef has a course nearly at right angles to that of the Maiden lode, and should intersect the latter. The main shaft is about 1,100 ft. to the eastward of the Maiden main shaft, and is served by the same tramway which goes to the latter. An adit-level has been driven to cut the reef, which proved to be from 2 ft. to 4 ft. wide, and yielded some good payable stone, often showing visible gold. A fault cut this off, and the drive was continued in soft ground some 152 ft. before cross-cutting to recover the lode. When this was cut again it was about 2½ ft. wide and payable, but going south became mullocky and valueless. Good gold is known along this reef for a total distance of 250 ft., the entire length driven being 431 ft. A winze sunk on the reef has gone down now about 45 ft., in good payable ore, often showing gold freely. The main shaft has been sunk 71 ft., and a level is being driven from it at the 60 ft. level to intersect the reef. The machinery on this shaft is of a temporary character, consisting of a steam-winch and steam-pump, driven by a semi-portable boiler of 14-horse power (nominal). A heavier plant will be obtained for working purposes.

The Lanigan's and Hilda reef is so called on account of formerly having been worked by two separate proprietaries, Lanigan's and the Hilda Gold-mining Companies. The work of the present owners has shown that the old workings were all on the same reef, Lanigan's adit being now below the old Hilda workings. In Lanigan's section of the mine the old low-level tunnel has been repaired by the present company and extended to a total length of 1,185 ft., and a drive east on the north branch of the reef has been made 77 ft. in length. In this some very fair stone was obtained. From the junction of the main and north branches westwards the reef was very poor for 584 ft., after which the chute of ore formerly worked by the Hilda Company at a higher level was met with, and has been driven through for 111 ft. This chute yields some good ore, with visible gold, but on the whole is of low grade at this level. The chute originally worked by Lanigan's Company continuing under foot in the adit-level it became necessary to sink a shaft to work it. This has been done, the shaft being 135 ft. in depth, with No. 1 level opening from it at 130 ft., or a little over 70 ft. below the adit-level. At 143 ft. east from the shaft Lanigan's chute of ore was cut, and has continued good up to the present, a total distance of 314 ft. from the shaft. The ore in this chute has been highly payable, and appears to be much richer than at the adit-level. The main shaft is equipped with a fine winding plant, supplied by the Union Ironworks, of San Francisco, U.S.A., consisting of a 10 in. by 16 in. double-cylinder double-reel hoisting-engine, with feed-pump and feed-water heater, supplied with steam from a 54 in. by 16 ft. horizontal tubular boiler, which also actuates a No. 9 Cameron sinking-pump, capable of raising about 10,000 gallons of water per hour.

In the Hilda section the No. 2 level is 90 ft. above Lanigan's adit. The cross-cut to the reef is 162 ft. in length, and from it the lode has been followed eastward 117 ft., and westward 723 ft. The eastern portion was worked by the Hilda Company. West of the cross-cut the lode was very poor for about 280 ft., where a good chute of ore began to make, and continued for 160 ft. From the end of this chute onwards the level has proved ore of low grade, with several short chutes of good payable stone. It has passed beneath a level known as the Hilda west tunnel, which is 125 ft.

above the No. 2 level. In this west tunnel, which is 170 ft. in length, there was a vein of fair gold-bearing stone on the south wall, but the bulk of the reef was poor. In the level below there has been a great improvement, both in the quantity and quality of the ore. The Hilda No. 1 level is 87 ft. above No. 2, and consists of a cross-cut 150 ft. in length and driving on the lode 105 ft. Some very rich ore has been got in this level, and the bulk is of fair value, showing the continuance upwards of the Hilda main ore chute.

The Lanigan's and Hilda reef runs nearly east and west, and dips almost vertically. The average width of the reef is from 4 ft. to 8 ft., but in the main Hilda ore chute it is 10 ft. The reef has now been proved by actual mining-work for a total distance of 1,870 ft. It is a fine strong lode, containing several well-marked ore chutes.

The Hilda Cross reef runs about east-north-east and west-south-west, and has been driven along for 303 ft., yielding several good bunches of gold-bearing quartz. The reef appears to be very much shattered at this level.

The Zealandia No. 2 lode runs north-westerly, and has been driven along for 185 ft. There is some fair stone on surface in this reef, but so far it has been poor at the tunnel-level.

The Zealandia No. 1 lode also yields fair stone on surface, but has been poor at the tunnel-level, except for a short chute of payable ore. The tunnel is in 334 ft.

The Australasia lode runs about north-west and south-east, and has been tested by two tunnels, No. 1 being 132 ft. in length, and No. 2 368 ft. Some very good stone has been got in No. 1 level, but the reef is very much broken.

The Oponui reef is a very large reef running north-easterly, and traceable by large outcrops on surface for about 50 chains. A large amount of prospecting has been done on this reef, six cross-cuts having been driven to intersect it. It is a huge mass of quartz, from 8 ft. to 30 ft. in width, but is generally very poor in gold. Near Lanigan's old dam, however, there is a chute of gold in the foot-wall portion of the reef, which has been proved for a distance of 320 ft., and is worth opening up at greater depth. Gold has also been got in a trench on the outcrop about 490 ft. to the north of these workings. The total amount of cross-cutting done to prove this lode and another large one west of it which outcrops on surface amounts to about 800 ft. In order to work the known chute of gold in the Oponui reef it will be necessary to sink a large shaft, the site for which has been partly excavated; but it is not intended to go on with this for the present.

Branches from the main railway-line run to the Carvill and Maiden Mines, to Lanigan's shaft, and the mouth of the Hilda No. 2 tunnel, and to the Oponui shaft. Two branches have also been made up Quartz Creek to get out mining and building timber, and to allow of the Zealandia and Australasia Mines being more thoroughly opened up. The company have bought the standing kauri forest in the Quartz Creek and Maiden Creek Valleys from the Kauri Timber Company, the estimated quantity purchased being 6,500,000 superficial feet. To make the most of this a sawmill has been built, driven by steam, containing a breaking-down frame, circular-saw bench, and breast-bench. This mill stands in the angle between the main railway-line and the branch lines up Quartz Creek.

The stone raised from the various mines will be trucked into hoppers over the railway branches, and thence drawn by a locomotive to the stamp-mill. This is now in course of erection at a central point in the Estates Company's property, about half-way between the above mines and the wharf at Whangapoua. The mill will use the wet-crushing and amalgamating process, with cyanide treatment of the tailings. The plant already contracted for and now partly on the ground consists of two Blake stone-breakers, 15 in. by 9 in. jaw-openings, four grizzlies 4 ft. by 10 ft., eight suspended ore-feeders, forty-stamp battery of 1,150 lb. stamps; and all the other usual appurtenances of a well-equipped mill. The machinery is made by Messrs. Fraser and Chalmers (Limited), at a cost, in London, of £2,567. The steam-power installation consists of one tandem compound Corliss engine, 12 in. by 20 in. by 36 in., and two tubular boilers, 60 ft. by 16 ft., with feed-pumps, heaters, &c. This is also of Fraser and Chalmers's manufacture, and costs in London £2,095 12s. It is proposed to add to the above two 5 ft. Huntingdon mills for regrinding the coarsest sands, four sets of spitzluten and spitzkasten for classifying, and a full cyanide plant for treatment of an output of 120 tons per day.

At the site chosen for the battery water-power can be obtained by a system of races combining the water from the Awaroa, Oponui, Waingaro, and Waitekuri Streams; but, as the first cost of this would be heavy, it has been decided to use steam until it is seen that the mines will certainly pay for the extra outlay.

The mill-site is chosen at a central point, to which quartz could readily be brought from the Waingaro, Waitekuri, Owerā, and Otanguru Valleys by an extension of the tramway system, as well as from the Oponui Mines. In all these valleys promising gold-bearing reefs have been discovered.

The railway-line and its branches at present constructed and under construction have a total length of track amounting to nine miles. The rails are 28 lb. per yard, made of steel, with flat fish-plates; 2,000 sleepers are used to the mile. The gauge of the track is 24 in. The locomotive is a Krauss engine, weighing about 7½ tons, capable of drawing a load of 24 tons up a gradient of 1 in 25. The steepest grade on the main line from the wharf to Oponui is 1 in 40, and the sharpest curve has a radius of 3½ chains. On the branch lines gradients of 1 in 25, and curves of 2½ chains radius, are employed. Ballast of good quality is cheaply obtained from shingle beds in the Waitekuri River.

At Whangapoua a substantial wharf has been built, 70 ft. long, with totara piles and kauri superstructure. A storage-shed is in course of construction. A large and strong goods-shed has also been built at the Oponui terminus.

The Owerā Mine lies four miles east of Oponui, in the basin of the Owerā River. A large amount of work was done here some years ago by the Owerā Gold-mining Company, who discontinued operations on account of the ore running down to a very low grade. The present company reopened and retimbered the old levels, and has greatly extended them, and has found a chute of gold quite to the north of the old company's workings. The reef runs north-easterly and dips to

the south-east. It lies in a high spur separating a branch of the Oweru Creek from one of the main branches of the Otanguru Creek, and has been attacked from both sides of the ridge, the total distance that the reef has been traced by tunnels being 1,850 ft. Two tunnels on the Otanguru side are known as No. 1 (Otanguru) and No. 2 (Otanguru). The first is 117 ft. below the crown of the spur, and the second 65 ft. below No. 1. In No. 1 tunnel the reef was cut at the end of a cross-cut 95 ft. in length, and has been driven along for 77 ft. The quartz was 2 ft. to 4 ft. in width, much iron-stained, rubbly, and of very variable value, some of it very good, other portions worthless. A short rise of about 12 ft. at the south end connects this with the No. 1 level from the Oweru side of the hill. The No. 2 (Otanguru) level is 428 ft. long, 313 ft. being on lode-matter. Here the lode is very mullocky and valueless. The No. 1 (Oweru) tunnel is in 379 ft. on the lode, which has been gold-bearing more or less all the way, parts being of really good quality. No. 2 (Oweru) tunnel is the top level of the old company, and has not been reopened by the present owners. No. 3 (Oweru) tunnel is about 165 ft. vertically below No. 1, or 200 ft. on the underlay. The two are connected by a winze sunk from No. 1. The No. 3 tunnel is now in 1,040 ft. In sinking the winze from No. 1 tunnel the chute of gold pitched northward, and the bottom portion became valueless, but driving northward at No. 3 level the gold came in again, and has been followed for about 200 ft. The lode is very large between its true walls, but is mostly filled with iron-stained mullock. The quartz vein is from 6 in. to 2 ft. in thickness, and, on the whole, of low grade. The No. 4 tunnel is 90 ft. below No. 3, and has been driven a total distance of 792 ft. on the lode, with cross-cuts totalling 245 ft. more. In this level the lode is very much shattered, and is valueless. This level is not yet far enough north to cut the chute of gold seen in the north end of the No. 3 tunnel. Another tunnel has also been put in to the south of the No. 4 level, and 60 ft. higher, which has been driven 214 ft. on the lode, with 100 ft. of cross-cutting. The lode is here little more than a smooth well-defined fissure. The Oweru Mine at present is not very promising, but it contains a considerable chute of proved gold-bearing stone which could be very cheaply extracted. There is a ten-head-stamp battery about half a mile from the mine, driven by water-power. This was built by the old company, and is now in rather bad order.

A large amount of work has been done by the Kauri Freehold Gold Estates on the Murphy's Hill Mine, about a mile and a half north-east from the Oweru Mine. Here there is a very large quartz reef, which has been traced on surface for 2,800 ft. Some years ago some very good gold-bearing stone was obtained from the outcrop at the south end, and in consequence a good deal of mining-work has been done here, but without success. The lode-matter steadily carries a little gold, but is not payable so far as work has gone. It consists largely of fractured angular blocks of quartz, with a great deal of soft earthy black oxide of manganese. The No. 1 level consists of a cross-cut 85 ft. and driving on the lode 256 ft. The No. 2 level is 100 ft. lower, and in it there are 250 ft. of cross-cut to the reef, and a further 136 ft. of continuation of the cross-cut, 140 ft. of driving southward on the lode, 607 ft. of driving northward on the lode, and 232 ft. of cross-cutting. The lode runs north-easterly. After trying the reef at this part without success another tunnel was put in at the north end of the outcrop. This has been driven 442 ft., in faulted, broken country, and has not yet met with the lode, though the outcrop is visible on surface directly overhead. A very large fault seems to traverse the whole country, nearly parallel with the lode, being met with both in this drive and in the extension of the No. 2 level cross-cut.

About 3,400 ft. north-north-west from the main Murphy's Hill workings a number of large loose quartz boulders have been found, some of which give good prospects of gold. To try for the reef from which these have come a cross-cut has been driven from the side of the Kuaotunu Road a total distance of 420 ft., through somewhat hard country. At 400 ft. a reef was met with, which has been driven along for 74 ft. It is small and poor where cut.

A large amount of work has also been done in the Lillis Mine, in the Te Ranga Block, near the top of the main range between Whangapoua and Coromandel. Here work has been carried on for seven years past by Messrs. Lillis and Ryan, who obtained several parcels of excellent "specimens," and took out, in all, some 1,300 oz. of gold. Several lodes are known to traverse the ground. The company's work has been confined to two tunnels principally, known as Lillis's tunnel and the Eastern tunnel. The Lillis Tunnel has been driven a total distance of 458 ft. across the line of the Lillis and Plutus lodes, and these have been followed northwards 152 ft. and 118 ft. respectively. The Eastern Tunnel cross-cut has been driven 240 ft., cutting two lodes. On the second of these, driving north has been carried on for 142 ft. A cross-cut has also been driven 70 ft. to intersect a lode which gives good prospects on surface near the eastern corner of the Lillis Special Claim. A road has been made, three miles in length, from the Waitekuri River up to the mine.

The expenditure of the company on wages alone, not including supplies and machinery, has been as follows: 1897—April, £1,536 4s. 6d.; May, £1,540 14s. 1d.; June, £1,311 17s. 1d.; July, £1,479 1s. 9d.; August, £1,845 7s. 8d.; September, £1,877 17s. 2d.; October, £1,458 12s. 11d.; November, £2,088 7s. 8d.; December, £2,542 1s. 5d. 1898—January, £2,352 17s. 5d.; February, £2,450 4s. 6d.; March, £1,971 17s. 11d.; April, £1,986 1s. 9d.; May, £2,117 3s. 8d.; June, £2,072 9s. 4d. Total for fifteen months, £28,630 18s. 10d.

#### BARRIER REEFS.

The following account of the Barrier Reefs Mine by Mr. Albion S. Howe, the manager, reached me too late for inclusion in my report:—

The property of the company consists of 80 acres freehold, situated on the Great Barrier Island. The ground is about two miles and a half from Blind Bay, and about one mile and a quarter from Wangaparapara in an air line, but by track and road these distances are nearly doubled. From Blind Bay towards the mine about three miles of wagon-road was lately constructed by the Government. This road is an improvement on the horse-tracks, but it never will be of much service to any of the mines working from low levels, as it has been carried

along too near the top of the hill. The present terminus of the road is about 500 ft. above the company's low-level tunnel, and when extended to the south boundary of the Barrier Reefs it will be about 600 ft. above the tunnel. As the mill and permanent plant of this or any other producing mine in this neighbourhood would naturally be placed at a level considerably lower than the said tunnel it will never pay to use the present road for transportation of ores and machinery when a road can be built on a level or constantly descending grade to the sea.

The present plant of the company consists of a 12-horse-power upright boiler and a donkey single-cylinder hoisting-engine, a circular saw, a corrugated-iron engine-house, corrugated-iron bunk-house and a cook-house for the men, a blacksmith's shop, and all necessary tools, &c., to work the mine. For the office and manager are two 9 ft. by 12 ft. tents, on wooden frames, with board floors. A 12 ft. by 14 ft. frame cottage, now in Wangaparapara, has been purchased, and will be taken down and moved to the mine, to be used as an assay office—a very necessary adjunct to a property of this kind.

The Barrier Reefs' upper level begins about 70 ft. from the boundary of the Great Barrier Gold and Silver Company's ground, and extends in a westerly direction on the Lee reef for about 150 ft.; at that point the reef has broken up and pinched out. The country at that point is a soft, sedimentary, and drift formation, and of a different nature from what we should get lower down. The mouth of this level was formerly about 20 ft. further to the eastward, but the ground was taken out in excavating for the engine-house. Eighty feet from the mouth of the upper level is the mouth of the upper level of the Great Barrier Gold and Silver Company. This level has been driven in their ground and on the Lee reef for about 450 ft. further to the eastward.

About 20 ft. from the boundary-line and between the mouths of the two tunnels is the 4 ft. by 6 ft. vertical shaft. This has been sunk to a depth of 214 ft. The last 120 ft. of this shaft was done by contract, and has just been completed. The sinking of this shaft will expedite the opening-up of the ground, and the shaft will always serve as an air-way to ventilate the workings below.

From the shaft a cross-cut tunnel is now being started to cut the reef at a depth of 202 ft. below the top of the shaft. According to a plan made by a surveyor for the company, this cross-cut will have to be extended 90 ft. from the shaft to cut the reef, but your manager thinks the reef will be cut at a distance of about 50 ft. in the cross-cut from the shaft.

As hard ground is expected in the cross-cut rapid progress is not likely to be made, and it is impossible to state the exact time necessary to do the work; but the work will be pushed ahead as fast as possible towards the reef. When the reef is cut a drive will be carried on it westward to connect with the low-level adit. According to the survey plan, the distance to drive along the Lee and Iona reefs to connect the shaft cross-cut and the low-level adit-tunnel is 335 ft.

The low-level adit is being done by contract. The contract was let for 600 ft. of tunnel. At this date 500 ft. of the tunnel has been driven, leaving 220 ft. more to drive before intersecting the Iona reef. The face of this low-level tunnel is in very hard, tough country, and the present progress there is slow. A progress of from 75 ft. to 80 ft. a month has been cut down to 5 ft. a week. According to the survey made for the company, this adit should cut a large reef (the Iona) at a distance of 720 ft. from its mouth. When this reef is cut it is the present intention to drive upon it in the direction of the shaft to meet the drive on the Lee reef coming from the shaft, both drives to meet at the same level. As the exact dip and strike of the Iona reef cannot be determined from the surface outcrop on this property there is an uncertainty as to where it will be cut 300 ft. below its outcrop, and possibly the junction of the two reefs may be to the westward from the adit-tunnel instead of east from it as shown on the plan. There are a number of leaders and other reefs showing on the surface and one other large reef, all of which, if they live down, will be cut by the tunnel. To avoid mistakes, and also to prove these veins, the tunnel should be extended to the south beyond the Iona intersection.

Should the present development-work now under way prove that the ore continues valuable in depth, then a more extensive development should be continued. The shaft should be sunk deeper and cross-cuts driven from it to the reef; levels driven, and the ground blocked out for stoping out the ore. The adit-tunnel should be continued towards the southern boundary of the property to prove the reefs that are known to traverse that ground. Should any of these prove valuable a large amount of ore can be blocked out on them, as the tunnel will cut such reefs about 500 ft. below the surface. At the same time, any other reefs encountered carrying payable ore could be opened up by driving on them from the adit-tunnel, which will cross-cut the mineral belt. All of this underground work could be under way while erecting a plant for extraction and while making the necessary surface improvements.

The work at the mine since the present company was organized has all been on developments, not on the reefs, and consequently our knowledge of the Lee reef has not increased since that time. The low-level tunnel will prove the ground, and it is the key to the whole hill to the southward, as all ores, whether in Barrier Reefs' ground or in ground of neighbouring companies, could be handled cheaper and with more backs through this tunnel than through any other tunnel likely to be driven into the hill in the near future.

The plan of development of the mine proposed when the company was organized has been and is now being strictly followed. Should the ores live in depth the shaft and adit-tunnel will be permanent and necessary improvements, and it will not take long to make the mine a steady producer and dividend-payer.

In continuing the work we apprehend no great difficulties. The water in the shaft is now causing some trouble, and there seems to be more coming in, but unless it more than doubles in quantity we will handle it without a pump. We are now baling about one-third of the time, using an iron ore-bucket with a capacity of seventy gallons.

There are over twenty reefs on this property, running in all directions, but the trend of the majority of them is from east to west, with a dip to the south of from 35 deg. to 80 deg. from the horizon. The reef upon which all the work has been done on this property, and also on that of our



neighbour to the eastward—the Great Barrier Gold and Silver Company—is a small reef from 8 in. to 2 ft. 6 in. in width, strike magnetic east and west, and dip 72 deg. south. This reef we call the "Lee reef," in honour of its discoverer, Thomas Lee.

The ore of the Lee reef at the surface is a silver-ore carrying gold, but in depth the percentage of silver decreases and that of gold increases, so that it becomes a gold-ore, with the gold-values much in excess of those in silver. The silver occurs as sulphides, stephanite, pyrargyrite, and proustite. The gold seems to be nearly all contained in the copper-pyrites. The ore is light in colour, except where banded by black streaks of stephanite. In appearance it much resembles that of the Comstock lode, Nevada, United States of America. The gangue is mostly quartz, with a little calcite.

The shaft was sunk 214 ft., and a cross-cut made to the reef. The reef was cut 50 ft. from the shaft; it was 18 in. wide, and good ore. This was about the 18th February. Work was then stopped at the shaft and confined wholly to the low-level adit. On the 31st March it was into the hill over 600 ft., and work has been continuous in driving it since that date. We expect to get the Lee reef about 800 ft. in, and then drive 300 ft. east on the reef to connect with shaft cross-cut. The adit will cut the reef about 350 ft. below the surface at that point. The shaft is in a gully near a creek, and is about 150 ft. lower.

The work of making connection from the present adit to the shaft cross-cut will take until November to complete. I wished to work both ways, from the shaft as well as from the adit, in making this connection, but the directors decided that the saving of time would not compensate for the extra expense of handling rock and water through the shaft.

### THE PERMANGANATE GOLD-RECOVERY PROCESS.

[By Professor BLACK, Otago University, Dunedin.]

This is a French invention, and is now being patented in all the Australian Colonies, the United States, South Africa, and Europe. It is a leaching process very similar in the plant required and in the manner of working to the now well-known cyanide process. It differs from the latter, however, in the chemical nature of the solvent solution, the rapidity with which it dissolves the gold, the method of precipitation or recovery of the gold from the solution, and in the important fact that it does not extract the silver from ores of that metal. If, however, the pulverised silver-bearing ore be roasted with from 3 to 5 per cent. of salt the permanganate process leaves the silver in a condition in which it is very amenable to the very cheap hyposulphite-of-lime leaching process.

The permanganate process can be used only on ores free from iron-pyrites or other sulphides or arsenides. Ores, therefore, that contain such refractory ingredients as these must undergo a thorough roasting process in a reverberatory furnace with a good current of air passing through it; and the roasting must be continued, with constant stirring, or rabbling with an iron tool, till all the sulphur is burnt away as sulphurous-acid gas or converted into the higher sulphate of iron. In this roasting the arsenic is oxidized and blown away as arsenious-acid fumes. Before removing the charge from the furnace it must stand the following test: Portions of the ore in the furnace are taken out from different parts of the charge so as to give a fair sample; these are mixed, and  $\frac{1}{4}$  oz. or so of the mixture is put into, say, a wine-glass, and covered with twice its bulk of the Etard permanganate solution, with which it is to be stirred up and then allowed to stand for ten minutes. If the purple-red permanganate still retains its own red tint the charge in the furnace is sufficiently roasted; but if the red tint is entirely bleached it is an indication that the roasting is not completed.

The presence of copper-pyrites or other copper compounds is no objection in the use of this process. Several samples of ore containing from  $\frac{1}{4}$  per cent. up to 6 per cent. of copper have been treated very successfully in quantities of 15 lb. to 40 lb. in the laboratory. One sample of copper-pyrites, containing 21 per cent. of copper, was roasted with salt to a dead or sweet roast, and on being treated with the permanganate solution behaved admirably, not reducing the colour of the solution, and giving up the gold just as well as if copper had not been present at all. No difficulty was found in treating parcels of 40 lb. of the most refractory parts of the Monowai ore, consisting chiefly of zincblende, galena or sulphide of lead, copper-pyrites or sulphides of copper and iron. With much galena in the ore it is better to begin roasting with a low temperature in the furnace, and a strong draft of air, letting the temperature rise gradually, and finishing, as in all other cases, with a strong red heat.

The lead and zinc of such ores as the Monowai become oxides of these metals in the furnace, and, beyond consuming more acid, these oxides have no injurious effect on the efficiency of the process, as they do not interfere at all with the permanganate, and therefore do not prevent the solution of the gold. The lead is retained in the leaching-vat as insoluble sulphate of lead. The zinc and copper pass out as sulphates and chlorides of these metals, accompanied by some of the iron as higher salts of iron, and none of these solutions has any deleterious effect on the gold-solvent.

When there is much antimony-sulphide in the ore the roasting is more difficult to carry out with satisfactory results, because this mineral melts or fuses at a comparatively low temperature, and in the fused state does not allow the air to get free access into the interior of the mass, and in this condition it is apt to obstruct the passage of the air, and protect the other refractories from the oxidizing action of the draft. To meet this difficulty common salt should be mixed with the ore before roasting, weight for weight with the sulphide of antimony supposed to be present, and a strong blast of air should be passed through the furnace, finishing with a long-continued high temperature. This treatment will carry away most of the antimony as chloride of that metal,

while the sulphur will be partly removed in fumes, and partly converted into the harmless sulphate of soda.

The difficulty with antimony-sulphide may also be met fairly, provided the ore does not contain more than, say, 5 or 6 per cent. of that mineral, by roasting without salt, but keeping the temperature down so as not to fuse the sulphide, and keeping the draft strong, and very slowly raising the temperature, but so as not to fuse any part of the charge, and finishing up with a bright-red heat, continued for several hours, or until fumes cease to come off, and till the charge answers the test given above. This treatment will send most of the antimony off in fumes, and convert what remains of it into the tetroxide of the metal, which has very little injurious action on the permanganate solution.

Ores containing much carbonate of lime, carbonate of magnesia, or other carbonates, are not amenable to the process, as there would be an expenditure of acid incurred in the proportion of about one part of sulphuric acid for one part of carbonate of lime in the ore. This means for every ton of ore an expenditure of  $22\frac{1}{2}$  lb. of sulphuric acid (costing, say, 2s.) for every per cent. of carbonate of lime in the ore. If, for example, the ore contained 5 per cent. of carbonate of lime, 1 cwt. of sulphuric acid (costing, say, 10s.) would have to be added to each ton of ore before the permanganate solution would dissolve any of the gold. The presence of much lime would be objectionable also (even with the addition of the acid) from the fact that the sulphate, not being very soluble, would tend to clog and retard the leaching.

The plant required for the permanganate process will be—(1) a vat in which to make up the solution; (2) leaching-vats; (3) either precipitating-vats or else charcoal filters, and in this last case a neat, clean, small furnace in which to burn the charcoal, from the ash of which the gold is recovered by fusion with borax. The solution- and leaching-vats, (1) and (2), should be made of wood (the harder the better), just similar in every way to the wooden vats now used for the same purposes in the cyanide process. But as wood, especially green new wood with its sap in it, has a reducing or decolourising and therefore destructive effect on the permanganate solution, these vats should be painted inside with a coating of paraffin, which has no reducing or injurious action on the solution. The paraffin coating or lining should be put on in the following way: The solid paraffin, or paraffin wax as it is called (costing about 8d. per pound), is melted in an iron pot over the fire, and heated till fumes begin to rise from it. It is then brushed in the melted state by means of a brush on the inner surface of the vat, in patches of 1 or 2 square feet at a time, till the whole inside surface is thoroughly covered with a skin of the paraffin. A hot flame, as from a painter's scarifying lamp (costing £1), to heat the wood strongly in front of the brush, secures a more durable coating of the paraffin, as it sinks more into the hot wood and takes a better hold of it. Any metal surface, such as the heads of nails inside the tank, should also be carefully paraffined, as all metals have a very destructive action on the permanganate solution. A coating of paraffin would do no harm to the precipitating-tanks, but it is not necessary in that case, and may be cheaply substituted by an application of a mixture of pitch and tar to prevent absorption; or, as recommended by Eissler and others, the precipitating-vats may be lined with sheet lead. Neither lead nor any other metal, nor the mixture of pitch and tar, can, however, be used for lining or coating the solution- or leaching-vats—(1) and (2). Indeed, an application of paraffin as above described is the only efficient lining for these vats. Glass would do, or tiles, or slate; but wooden vats lined with paraffin seem preferable from an economic point of view to any other materials for these (1) and (2) vats.

The vats may be of any size and any shape; square or oblong would be just as good as round, and probably cheaper. The great thing is to have them well paraffined to begin with. One thorough dressing of paraffin as described should not require renewing for months, but if at the discharging of a vat a naked place is noticed it will be an easy matter to rub it dry and apply the paraffin.

The permanganate solvent solution contains 12 lb. of common salt, about 14 lb. of strong sulphuric acid, and about 6 oz. or 7 oz. of permanganate-of-potash crystals, all dissolved in every 100 gallons of water. The solution is made up as follows: The salt and permanganate in the proportion named above are weighed out and thrown into the paraffined solution-tank; the water is then run in, and the contents of the vats stirred, so as to dissolve the salt and permanganate. The sulphuric acid is then mixed with about six or seven times its bulk of water in a separate vessel—say, a stoneware jar, glass jar, paraffined wooden bucket, or vessel of any kind lined with lead (the acid being poured into the cold water and not the water into the acid). This acid mixture is then poured into the vat, which already contains the salt and permanganate, and the whole is stirred with a wooden rod or stake, to insure a uniform mixture. The wooden rod should be withdrawn as soon as the stirring (which need not occupy more than half a minute) is finished, as bare wood weakens the solution.

The solution thus prepared has a fine deep violet-red colour and an acid salt taste. It is quite harmless in small quantities; indeed, when mixed with eight or ten times its bulk of water it would make a very wholesome and agreeable summer drink. So long as the solution retains a violet or reddish or pink colour it has the property of dissolving gold, and may be used over and over again for this purpose, becoming richer in gold and paler in colour at each time. It cannot, however, be used again after the gold has been precipitated from it, as the same agents that throw down the gold will bleach or decolourise the solution, and thereby utterly destroy its power of dissolving gold.

So soon as the reddish or violet colour is destroyed, from whatever cause, the gold-dissolving power is quite gone. If the colour is weakened or made paler it may, however, be restored by the addition of more permanganate of potash, either with or without the addition of salt or sulphuric acid. In some cases, when the colour is nearly gone but the acid taste still perceptible, it is economical to revive the colour by a small addition of permanganate dissolved in water. One soon becomes acquainted with the colour of the most effective solution, and it is an easy matter to keep the colour up by such additions.



The leaching-vats, as described, may be of any size or shape—round, square, or oblong—made of wood, and the inside, bottom of course included, brushed over with melted paraffin (2); a convenient depth would be  $5\frac{1}{2}$  ft. or 6 ft. On the bottom is placed a filter-bed of (commencing at the bottom) coarse clean quartz pebbles,  $\frac{1}{4}$  in. to  $\frac{3}{4}$  in. size, and free from pyrites or other sulphides, this layer occupying, say, 6 in. or 7 in. in depth; resting on this another layer of smaller quartz pebbles or gravel; and on this again still smaller quartz gravel, or coarse sand, the whole being topped with fine clean sand. The whole depth of such filter-bed would be 12 in. to 14 in. There must not be any sulphides or any other reducing agents, or sea-shells or limestone, or black oxide of iron in these filter-beds, nor, indeed, anything that reduces the colour of the permanganate solution when steeped in it for a day or two. Quartz pebbles and quartz sand, when free from pyrites or other sulphides, answer the purpose very well, but should be tested by steeping samples in a little permanganate solution for, say, two days: if the solution by the end of that time will be found to retain its true colour, the materials will be suitable for making the filter-bed.

The bluestone basalt road-metal at Dunedin, broken up, is found very suitable; but the scoria about Auckland and the road-metal there is utterly unsuitable, as it contains a good deal of the magnetic or black oxide of iron, which has a very deleterious effect on the permanganate solution, and was a source of much trouble in experiments conducted in Auckland in March last. For small laboratory experiments pounded glass makes a good filter-bed; but if it be pounded in an iron mortar it is liable to contain small particles of metallic iron, which is also very injurious to the solution.

The ore, crushed and passed through a 30-wire sieve (900 holes to the square inch), or the concentrates, or concentrated tailings, as the case may be, after thorough dead- or sweet-roasting, and tested for deadness as described above, are placed in the leaching-vat on the filter-bed to the depth of 3 ft. to 4 ft. or  $4\frac{1}{2}$  ft., and the permanganate solution run on gently and evenly till it covers the ore and stands a few inches above the level of it. The solvent action is so rapid that the short wooden pipe leading to the precipitating-vat or charcoal filter-bed may be opened at once. The permanganate solution is then allowed to trickle slowly from the solution-vat (1) into the leaching-vat (2) at the same rate as the outflow from the leaching-vat into the precipitating-vat or filter-bed. The percolation proceeds much faster with the acid permanganate than with alkaline cyanide. Gold begins to make its appearance in the outflow usually within a quarter of an hour to half an hour after this overflow begins. The presence of gold in the outflow is indicated by the greenish-blue or greenish-violet colour produced when some ferrous sulphate solution is added to a portion of it in a test-tube or a wine-glass. The richness in gold of this outflow increases for some time till it reaches a maximum, then it goes level (continues of the same quality) for some time, varying in different ores (according to the coarseness of the particles of gold) from an hour up to perhaps five or six hours, or still longer in some cases. The richness then diminishes very gradually; and when this diminution is thoroughly pronounced it may be taken to indicate that all the recoverable gold is in solution, and only requires washing out with water instead of the permanganate. The permanganate-solution tap is therefore closed, and leaching with water continued for a few hours till very little or no more gold is coming through.

The man in charge of the leaching operations tests a sample of the outflow from time to time in a glass test-tube or wine-glass by adding to it a small quantity of the protosulphate-of-iron solution, and he judges the degree of richness by the depth of greenish-blue or brown colour produced.

At Mount Morgan Mine, in Queensland, the process-manager recognises eight degrees of richness by the degree and shade of colour so produced by the sulphate of iron. The degrees are—(1) light trace, (2) trace, (3) strong trace, (4) light black, (5) black, (6) strong black, (7) rich, (8) very rich. If the outflow should not show the gold indication nor the pink colour for any considerable time—say, an hour or so—it is something in the charge that is robbing it, owing to imperfect roasting. A sample of it should then be tested as follows: A small quantity of the permanganate solution—say, five drops—should be put in a wine-glass or test-tube, and the outflow should then be run into this; when, if it rapidly destroys the colour of the five drops of permanganate, it is an indication that, from insufficient roasting, there is in the charge in the leaching-vat either protosulphate of iron or some metallic sulphide or arsenious acid, or the sulphide of some metal. Of course, if the test for effective dead-roasting or calcining mentioned near the beginning of this article were properly made, and with a satisfactory result, this will not happen, and the gold will come early. As the leaching proceeds, the purple-red-violet colour will be deepening in the outflow, and could, when very deep, be economically returned into the vat with all its load of gold in it; for so long as the rich red colour is there the solution is capable of dissolving more gold, and so enriching itself still further.

The gold is recovered from the leach in the precipitating-vats by the addition of a strong solution of freshly prepared green crystals of ferrous sulphate (protosulphate of iron, or “green vitriol”). This solution of sulphate of iron is made by dissolving the green crystals in water. The addition of iron nails and some sulphuric acid keeps the solution fresh for a long time—many days—and strengthens it by the formation of more sulphate by the action of the acid on the iron.

Instead of dissolving the green crystals of ferrous sulphate, the iron precipitating solution may be made by steeping scrap-iron, pieces of iron (not galvanised), fencing-wire, or iron nails, or indeed any pieces of iron, in dilute sulphuric acid, one part of strong acid to eight or ten parts of water, or even weaker still. The first effect of the sulphate-of-iron solution is to quite decolourise or bleach the permanganate colour in the precipitating-vats; and enough must be added to do this. The next and almost immediate effect is to throw the gold out of solution, or, in other words, to precipitate the gold in a very fine state of division—so fine, indeed, that the precipitate has not the ordinary yellow colour of gold at all, but appears dark-brown when there is much present, or bluish-green or violet when there is only a little present.

The sulphate of iron solution must be stirred into the liquid very thoroughly, so as to come into full contact with every part, and thus precipitate all the gold. The fine gold will settle to the bottom in the form of a brown-coloured gold slime, which is really pure gold, in the course of twenty-four

hours or so, when the clear water may be run off, the slime collected, washed by shaking up with fresh water, again allowed to settle, collected, dried, and fused with borax into a cake of yellow gold.

The gold may also be precipitated in the vats by passing a current of sulphurous-acid gas into the solution, with stirring, so that the acid may come in contact with every part of it, first decolourising the solution and then throwing down the gold. By this sulphurous-acid process the gold is thrown out in coarse particles, and settles to the bottom more rapidly than when sulphate of iron is the precipitating agent.

The sulphurous-acid gas—more correctly named sulphur-dioxide—is made by heating, in a glass retort, either charcoal or sulphur with strong sulphuric acid, and leading by a glass tube the gas thus made into the solution in the vat.

Instead of running the outflow into precipitating-vats it may, as at the Mount Morgan Mine, be passed into a bed of wood charcoal, the pieces of charcoal being of the size of from a pin's head to peas and beans, or even larger, the bed being, say, 1 ft. or 2 ft. deep, in a small vat, say, 3 ft. diameter by 3 ft. deep. The charcoal decolourises the liquid, and extracts or arrests or precipitates on itself the gold. The liquor is allowed to percolate through among the charcoal, and pass away by an outlet at the bottom of the charcoal-vat. The outflow from this charcoal filter-vat may be tested occasionally by the addition of a little sulphate-of-iron solution to a portion of it in a wine-glass, when any gold present will at once reveal itself by imparting a greenish tint to the solution. The charcoal, when saturated with gold, is then carefully burnt to ashes in a nice clean furnace; the gold is in the ash, and is recovered by fusion with borax.

The most important points that require the most careful attention in this process are—(1) The proper roasting (to a perfectly dead roast) of the ore in a furnace of the reverberatory type, in which the ore does not come in direct contact with the fuel, and in which there is a good draft of air sweeping the flames across the fire-bridge over the surface of the ore, while the latter is being continuously rabbled to bring fresh portions to the surface, and therefore into contact with the oxygen of the air; (2) the second point of importance is the making-up of the solution according to the prescription given above. The solution should be made, if convenient, on the day on which it is to be used, as it slowly loses strength on being kept. It should not be kept more than two days in any case.

Instead of the prescription given above—namely, 12 lb. of common salt, 14 lb. of strong sulphuric acid, and 6 oz. or 7 oz. of permanganate crystals per 100 gallons of water—Etard, of Paris, the inventor, recommends, where (as in Europe) muriatic acid is cheap, a solution containing 45 lb. of strong commercial muriatic acid (or hydrochloric acid), 12 oz. of permanganate crystals dissolved in 220 gallons of water. This is called the Etard permanganate solution. The other is called the Black-Skeet permanganate solution, and is for economical reasons suggested as preferable in these colonies, where sulphuric acid is readily and cheaply made or purchased.

At quotations from Sydney, Dunedin, and Melbourne the Black-Skeet solution will cost about 1d. a gallon, and with properly calcined ore from 100 to 150 gallons should be quite sufficient for the leaching of a ton of roasted ore. The most favourable result got at the Mount Morgan Mine on the properly roasted ore was an extraction of 94½ per cent. of the gold, at a cost for chemicals of 4s. 6d. per ton. At the Permanganate Company's works at Dunedin a ton of Mount Morgan roasted ore, assaying 10 oz. 15 dwt. to the ton, gave an extraction of 95·6 per cent. of the gold by nineteen hours' treatment, at a cost of 4s. 4½d. per ton of roasted ore.

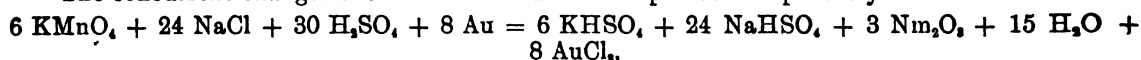
These permanganate solutions—the Etard and the Black-Skeet—do not generate chlorine gas to any appreciable extent in the absence of gold or something else that has an attraction for chlorine. Indeed, it is claimed that in the process there is practically no chlorine gas generated (no free chlorine produced), but that the gold takes the chlorine direct from the hydrochloric acid in the Etard solution, and from the common salt in the Black-Skeet solution. Gold, it is well known, does not take chlorine from hydrochloric acid nor from common salt without the intervention of some other active ingredient. In the Etard solution this active ingredient is the permanganate, supplying, as it does, oxygen to the hydrogen of the hydrochloric acid, and forming water, and thereby enabling the gold to get the chlorine of the broken partnership. In the Black-Skeet solution the same end is obtained by the oxidation of the sodium of the salt, thereby fitting it for union with the sulphuric acid to form bisulphate of soda, while the other partner in the salt (namely, the chlorine) is in a position to make a new arrangement and ally itself in a partnership with the gold as chloride of gold. It cannot in either case be called "catalytic" action, nor can the chlorine be called "nascent," for chlorine is not liberated at all; it is never free; it does not leave the sodium till it is in union with the gold; it is, at no stage, between the two metals. The reaction would be better described in each instance as a case of "concurrent affinity," in which two factors in the Etard manage, by their concurrent attraction—drawing in opposite directions—to effect the separation of the hydrochloric acid into its two constituents—hydrogen and chlorine—the oxygen of the permanganate taking as its share the former, and the gold the latter, thus becoming water and chloride of gold. In the Black-Skeet three factors are concerned simultaneously in effecting the chemical changes—namely, (1) the oxygen of the permanganate unites with the sodium of the salt; (2) the soda thus produced unites with the sulphuric acid; and (3) the gold pulling at the chlorine of the salt, manages to capture it, owing to the simultaneous capture of the sodium of the salt by the oxygen of the permanganate. In the Black-Skeet solution the sodium would not break its partnership with the chlorine of the salt without the aid of the gold in taking the other partner. On the other hand, the gold could not take the chlorine from the sodium of the salt without the aid of the oxygen taking charge of the other partner—namely, the sodium; and, in its turn, the oxygen would not take the sodium if the sulphuric acid were not present to unite with the soda thus formed.

The whole of the simultaneous concurrent changes in the Etard process may be shown by the following equation:—



which may be translated thus: Six molecules of permanganate of potash and thirty molecules of hydrochloric acid and eight atoms of gold produce six molecules of chloride of potassium, three molecules of sesquioxide of manganese, fifteen molecules of water, and eight molecules of the trichloride of gold.

The concurrent changes effected in the Black-Skeet process are probably as follows:—



which, in plain English, would read thus: Six molecules of permanganate of potassium, twenty-four molecules of common salt, thirty molecules of sulphuric acid, and eight atoms of gold produce six molecules of bisulphate of potash, twenty-four molecules of bisulphate of soda, three molecules of sesquioxide of manganese, fifteen molecules of water, and eight molecules of trichloride of gold.

It has already been stated that the permanganate process does not deal with silver in the ore. That metal, indeed, when present as an alloy of silver and gold, obstructs the solution of the gold by forming a coating of insoluble chloride of silver on the surface of the particles of bullion, and this protects what gold there is in the bullion from the attack of the solvent.

In the case of ores such as the Monowai, City of Auckland (old Sylvia), Great Barrier, the low-level refractory portions of the Waihi and of the Waihi Grand Junction and other Upper Thames mines, where the silver is present chiefly as sulphide rather than as alloy, the permanganate process has proved most successful by numerous laboratory experiments on parcels up to 56 lb. weight, after a dead roasting with 3 to 6 per cent. of salt. By such roasting the silver of these Upper Thames and Monowai ores is converted in the furnace into chloride of silver, which has not, so far as yet observed, had any retarding action at all, in the case of such ores as these, on the extraction of the gold up to from 90 to 98 per cent. Indeed, the most rapid extraction yet obtained has been got from the most refractory parts of the Monowai ore, specially picked out at the mine for its refractory character, as a severe test for the permanganate process. In this case the samples put through contained about 22 per cent. of zincblende (or sulphide of zinc), 8 per cent. of galena (or sulphide of lead), 3 per cent. of copper-pyrites, and 9 per cent. of iron-pyrites. The ore thus contained 42 per cent. of the sulphides of zinc, lead, copper, and iron. The silver was present in the proportion of 546 oz. to the ton, and gold 9 oz. 14 dwt. per ton. The ore was ground and passed through a 40-sieve (1,600 holes to the square inch). It was then mixed thoroughly with 6 per cent. of salt, and roasted to a perfectly dead state in the Permanganate Company's reverberatory furnace at their testing plant in Dunedin. The roasting process occupied eight hours, the temperature being kept low at first, and gradually rising (while the charge was being constantly turned over or rabbled) to a full red heat, and kept so till a portion of it steeped in twice its bulk of the permanganate solution, and shaken up, left the purple-red colour of that solution very little changed.

The roasted charge was then placed on the filter-bed of clean gravel and sand (described above) in a 5-gallon glass cylinder, fitted with the necessary outflow-pipe. The permanganate solution was then put on it, the outflow-pipe being left open, and within ten minutes of the commencement of the outflow the gold was beginning to come through. In one hour from the start it had reached the very rich indication, and retained that for three hours. The gold indication then began to go down very slowly, until at the end of another three hours it was at "black." The leaching (or rather washing now) was then continued with water instead of permanganate until only a trace of gold was coming through. The whole time occupied in the leaching and washing was thirteen hours.

The gold was then precipitated by protosulphate-of-iron solution, washed, collected, melted, and weighed, showing a 96.5 extraction of that metal. The charge was now ready for the recovery of the silver by the hyposulphite-of-lime (thiosulphate of calcium) process. The acid was found to have been well washed out of it by the water used in the last stage of the leaching just described. The hyposulphite-of-lime leaching was continued till, at the end of another period of sixteen hours, only a trace of that metal was coming through. The hyposulphite used was made on the spot by heating flowers of sulphur with slaked lime and water till the solution had a yellowish-brown colour. It was then decanted, and a current of sulphurous-acid gas (sulphur-dioxide) was passed through it till it smelt strongly of that gas. This solution, now colourless, after the subsidence of the free sulphur, was used as the leaching liquid for the silver, as described. The silver was afterwards precipitated as sulphide by the addition of sulphuretted hydrogen and a little ammonia. The black precipitate was then roasted and fused with carbonate of soda and a little saltpetre to recover the silver. The extraction of silver was 97 per cent.

The hyposulphite of lime can, as the materials (lime and sulphur) are cheap, be made in large quantities at little cost, and, with such a fine extraction in rich gold-silver refractory ores such as the Monowai, Sylvia, and the deeper parts of the Upper Thames mines produce, will be a most satisfactory and remunerative adjunct to the permanganate process.

Similar laboratory experimental trials on parcels of ore weighing from 6 lb. to 56 lb. were made at the Dunedin University Laboratory. The ores treated were from nine different mines on the Thames and Upper Thames; the Barewood and Premier concentrates (containing 30 to 50 per cent. of iron and arsenical pyrites and a little antimony), in Otago; the Mount Morgan refractory ore from Queensland, containing about 20 per cent. of iron-pyrites and 2 per cent. of copper-pyrites; the Great Barrier ore; the Beaconsfield concentrates (the richest gold-mine in Tasmania); and about fifteen refractory sulphide-ores from Gippsland, Stawell, and other parts of Victoria; and from the Dromedary Mine, in New South Wales, containing about 30 per cent. of copper-pyrites. In all these cases, the roasting being perfect, the extraction of gold did not fall below 89 per cent., the average being between 93 and 96 per cent.; and where the ore was treated for silver as well as gold, and the salt-roasting preceded the permanganate and was followed by the hypo, the silver-extraction gave from 82 to 98 per cent.

I do not think the process will profitably treat bullion containing, say, half as much silver as gold, but it will (with the salt-roasting) treat ore in which there is any amount of silver as sulphide

merely, and not as bullion. This has been abundantly proved by the treatment of the Monowai and other Hauraki Gulf ores. The largest parcel treated at one time by the process was 22 cwt. in the company's vats in Dunedin. It was from the Mount Morgan Mine, in Queensland, and had been roasted at that mine before being sent to Dunedin. The ore contained 10 oz. 15 dwt. of gold per ton. The extraction was 95·6 per cent. of the gold, at a cost in chemicals (salt, sulphuric acid, and permanganate) of 4s. 4½d. per ton.

The best extraction at the Mount Morgan works, where several trials were made, was 94½ per cent., at an estimated cost, after roasting, of about 4s. 6d. per ton.

The points that require most careful attention—repeated here for the purpose of emphasizing them—are: (1) Perfect dead calcination (with salt in the case of much copper or silver or both); (2) a perfectly clean pure quartz filter-bed; (3) due attention to the proportion of the ingredients in making up the solution; and (4) seeing that the solution-tanks and leaching-vats are protected internally by a coating of paraffin-wax, as described above.

### ELECTRO-DEPOSITION OF GOLD UPON THE GOLD OF OUR DRIFTS.

[By WILLIAM SKRY, Analyst to the Department of Mines. Read before the Wellington Philosophical Society, 22nd December, 1897.]

If among the many strange and fanciful theories that the ancient digger and the masterful miner have invented for the explanation of the various phenomena that they have observed in the solitudes of nature's laboratory there is one that as first presented to us appears the strangest—the farthest fetched of any of these—it is, I think, the one which maintains that the nuggets of our drifts have generally grown or been formed therein, and that even all gold can also grow therein—that is, *in situ*—and this by a kind of selective process, by which it accretes to itself the gold from its solution in the auriferous waters that flow around it—that, in fact, under favouring conditions every particle of gold acts as a nucleus for any soluble gold that it comes in contact with—that in reality gold as present in our spring waters has the same tendencies to go to gold in its *uncoined* state in the domain of nature as it has in its *coined* state in the hands of those who have it.

Nor was this wild theory of the digger and the miner merely a speculative one, for they believed in it to such an extent that they acted up to it by purposely leaving gold—a little “seed-gold,” as they termed it—in their tailings to draw the precious metal to itself for a profitable rewashing thereof.

The first scientist, so far as I am aware, who had the hardihood to patronise this theory—to father it, I may say—was Dr. Selwyn, Secretary to the Mines Department, Victoria. This was in the sixties. His precise theory, as stated before the Royal Society of Victoria,\* is thus given: “That nuggets may be formed, and particles of gold may increase in size, through the deposition of gold from the meteoric waters percolating the drifts, which water, during the time of our extensive basaltic eruptions, must have been of a thermal and probably of a highly saline character, favourable to their carrying gold in solution.”

Thus Dr. Selwyn; and though he did not furnish anything in its favour of a very convincing kind—nothing much more, in fact, than had already been adduced—he had performed the signal service of giving to this wild and unproven theory an air of respectability—the sanction of a great name: he had brought it to the forefront of science, and it was not long before converts to these views were made, one of whom, and the first, I believe, was Professor Ulrich, who gave much attention to the subject, and his remarks thereon appear in the work on the “Goldfields of Victoria,” by Mr. R. Brough Smyth, F.G.S., pp. 356–57. In these he particularly draws attention to these three facts—(1) That nuggets even above 1 oz. in weight are of rare occurrence in quartz reefs; (2) that a tremendous cataclysmic force would be required to move large nuggets to the situation in the drifts that we find them in; and (3) that there is a great difference in the standard of fineness between alluvial and reef gold.†

But whatever quantity of evidence had been adduced geologically for this accretion of gold on gold, one thing was lacking, for the theory had no solid ground to rest upon so long as the chemist did not, or could not, show some natural process by which was effected this building-up of gold on gold in the coherent reguline lustrous form that all nuggets and particles of native gold have taken.

Years passed away, and no evidence of this kind was forthcoming, when, about the year 1871, the scientific world was startled by an announcement from Mr. Daintree of a very singular and unexpected circumstance that he had observed bearing on the question. Professor Ulrich states the matter thus: “Mr. Daintree's discovery consisted in the fact that a speck of gold lying in a solution of chloride of gold increased several times its original size after a small piece of cork had accidentally fallen into the solution.”‡

Here, then, appeared to be the “one thing that was wanted” to show how gold can accrete gold to itself in a natural way, and discovered by one of those accidents that luckily had an observer, and one who was competent to see the full significance of it. Thus, it appears that all we require for this accretion of gold on gold in our drifts is a weak solution of gold in an acid, organic matter therein of a somewhat unstable character, and metallic gold. I say here “it appears,” for it will be noted there is a tantalising lack of detail, of precision, and, indeed, of certainty, in the description of the circumstances of the case that detracts greatly from the value of the evidence; and yet there was such a promise of useful knowledge to be gathered by a careful

\* Trans. and Proc. of the Royal Society of Victoria, vol. ix., p. 53.  
nuggets of reef gold can ever have any notable proportion of their silver substituted by gold when they get into our drifts, as the atomic volumes of the two metals are practically the same.

† It appears very improbable that  
‡ “The Goldfields of Victoria,” by R. Brough Smyth, Secretary of Mines, Victoria.

investigation of the case that I among others attempted it, but, for myself, was quite unable to realise the promise—in fact, I was unable to repeat the phenomenon as described. I got nothing to indicate that gold is nuclear to itself in solutions that contain organic matter, whether in a solid or in a dissolved form. The effect of such matters (organic), I found, was rather to disperse any gold it reduces than to concentrate such gold in a nuggety form.

The results of these researches of mine were contained in a paper which was read before the Wellington Philosophical Society in 1872, and from this paper I make the following quotations:—"So far, therefore"—alluding to results just stated—"gold reduced from solution of its chloride by aid of organic matter, such as cork or wood, does not in the manner of its deposition exhibit such a notably selective power for metallic gold as the description of Mr. Daintree's results lead us to suppose. It does not, indeed, show any such selective process at all—that is, to a greater extent than can be attributed to the action of surfaces generally regardless of their nature; and in support of this I believe I am quite correct in stating that the whole sum of our experiences (omitting those of Mr. Daintree) is directly against this theory. . . . So far as I am aware, we only produce by these means (organic matters) fine incoherent powder—minute crystals or films of exceeding thinness, nothing at all nuggety."

I have since learned that Mr. Cosmo Newberry, late Analyst to the Geological Survey of Victoria, has confirmed the general accuracy of these assertions of mine by showing that gold is not nuclear to gold under the circumstances given by Mr. Daintree.

Thus it seems that, after all, as yet we have got nothing more than the hazy, crude idea of the Old-World digger of the growth of nuggets in our drifts, an idea that many geological facts support, while others are antagonistic to it. And this growth of the nugget has been asserted by scientists to have been produced by nuclear action. Nuclear action, indeed! *alias* nuclear force! I take it to be of the same misbegotten fraternity as the centrifugal and centripetal forces of our oldest school-books—those learned terms that only obscured the truth they were invented to show.

A long period of time again passed; the subject had apparently dropped out of mind, when a second time the scientific world was startled by a communication on the same subject, and for the same object. This time it was Mr. Charles Wilkinson, of the Geological Survey, and evidently the theory of Mr. Daintree, above detailed, had worked in his mind, and inspired its operations—the possible or probable nuclearity of gold for gold as in our drifts—that is, under natural conditions—had yet to be proved. But, as he thought, why limit the problem to gold? Why not try some of the native minerals that frequently exist along with gold? Filled with this idea, he, after making numerous unsuccessful experiments, at length tried the metallic sulphides, and was handsomely rewarded. He had, as he thought, got the key to the problem. His results are given in a paper entitled "On the Formation of Gold Nuggets."† Shortly stated, this paper informs us that cupreous and iron sulphides, arsenical pyrites, galena, zincblende, stibnite, wolfram, and molybdenite act as gold does for nuclei to gold as reduced and precipitated from its chloride in water by organic matter.

The accuracy of these statements thus given by Mr. Wilkinson was soon afterwards vouched for by Mr. Cosmo Newberry. Here, then, at last it appeared that this so-called "nuclear action" of a solid substance for gold had been sheeted home—that certain kinds of minerals can accrete, can attract, as it were, unto themselves the minute particles of gold that organic matters liberate from auric chloride, and mould these to the coherent, the crystalline, the massive form of the metal as we see it in the nugget; and thus the idea of a nuclear action of gold itself for gold, as Mr. Daintree's observation favours, receives apparently a further accession of proof.

These results that Mr. Wilkinson obtained very much interested me, and I repeated them with such variations as my previous knowledge of the subject, and particularly of the dispersing effect of organic matter on gold solution, led me to make.

Leaving out, then, the organic matter, I simply introduced a crystal of pyrites into the weak solution of gold trichloride in distilled water, when after a two-hours contact I found that this crystal was completely gilded over. The metal thereon was lustrous and coherent, and the crystal had all the appearance of solid gold. I afterwards found that the metallic sulphide arsenides generally as used without organic matter had the same effect as pyrites. Thus it was proved that derelict atoms of gold are not required for the accretion of gold on gold in the concrete form which obtains in our auriferous drifts.‡

The explanation of this liberation of gold from its solution is simple. For this we must look upon the gold in solution as being a part of the combination—hydrochloride of oxide of gold, or hydrated trichloride of gold, the oxygen of which oxidizes both the sulphur and the metal of these sulphides so as to leave the gold upon them at the scene of action in the metallic state.

But this, though explanatory of the reduction of gold, is not explanatory of the fact that the gold thus reduced is (the greater part at least) close and reguline, in place of its particles being more or less discrete, as they would be in the case of a deposit by simple reduction. This, I find, however, is explained by the fact that after the first few seconds of contact of the metallic sulphide with the auriferous solution the gold is deposited electrically—that, in fact, an electrical current is produced by the oxidation of the sulphide, and so the process is an electrolytic, an electro-gilding one.

In all this we have a proper rendering of the terms "nuclear action" or "nuclear effect" if we wish to keep them up in all their absurdity—gold can be nuclear to gold only as under the influence of an electric current.

Thus it comes about as probable—indeed, as a certainty, I think—that if the nuggets and particles of gold in our drift formations do accrete gold—do exercise a "nuclear effect, as it is termed, for gold—it is under the directing influence of an electric current, or perhaps I should say

\* Trans. N.Z. Inst., vol. v., p. 372. † Trans. Roy. Soc. Vict., vol. viii., art. ii. ‡ Although I have some twenty years ago published this fact—viz., that organic matter is not necessary for the gilding of pyrites, &c., in this way—authors of works on gold do not correct the old idea by this later knowledge.

it is simultaneously with the production of an electric current at the seat of action. In regard to this, we have seen that in our metallic sulphides as associated with auriferous solutions we have the means for producing electric currents—that is, electrolytic action; but, except in the case of our deeper-seated reefs, we do not get these sulphides, and, as in contact with the gold of our drifts we only get it rarely, therefore the question we have is this: Does there exist a general agency in these drifts for the production of electric currents in or in juxtaposition to the gold of these drifts? This question that I have just worked up, and in such a way as to incorporate here the historical facts above stated, I shall endeavour to answer, and in the affirmative. I shall, as I think, show that there are in these auriferous drifts generally the means whereby the electro-deposition of gold on gold can be accomplished, and this in a general, a natural way; and I shall also endeavour to show what these means are.

Now, it is on record\* that in 1876 I communicated to this society a knowledge of the fact I had just then discovered, that electrical currents are generated by platina when paired with graphite in alkaline and also in saline solutions; a fact that, by the way, I afterwards found had just a little prior to this time been announced both by Professors Becquerel and Gauguain† in publications to which I had not access for years afterwards. At that time I attributed these currents to chemical action at the surface of the platina, and not to a mere polarisation of the metal, as Professor Becquerel maintained. Thoroughly believing my view of the case to be correct, it occurred to me, in view of the question before us, to carry my investigation of the subject far enough to ascertain whether any of our noble metals do give, in alkaline solutions, electric currents sufficiently strong and persistent to decompose acid solutions of gold and deposit the metal in the form in which we find it in our auriferous drifts. For my first—my tentative—experiment I made choice of platina as the metal that, if it did give me any results at all, would exhibit them with unmistakable clearness. Thoroughly cleaning a wire of this metal in suitable acids, I waxed it to within  $\frac{1}{4}$  in. of each extremity, and then plunged one end of it in a weak solution of caustic potash, and the other end I placed in a very weak solution of auric chloride, making the interpolar connection between the two vessels containing these solutions with stiff gelatine in a U-shaped glass tube, when, after the expiration of four hours, I found the platina wire was gilded up to the waxed part, while in twenty-four hours all the gold of the solution had been electro-deposited on the platina wire. The gold was in the highest degree solid, lustrous, and reguline.

This was very encouraging, so I at once continued the investigation by experimenting upon gold, and the results of this I herewith state as shortly as I can, and in the order that I obtained them:—

1. When pure gold in weak or strong solutions of an alkali is electrically connected with gold in a weak solution of the terchloride of that metal a deposit of gold (out of the metallic solution) upon the gold therein occurs, and this gold is both lustrous and coherent.
2. When the ordinary acids, such as hydrochloric, sulphuric, and acetic acids, also the neutral salts generally, are substituted for the alkali the same effects are produced, but at a much slower rate.
3. Common spring water and distilled water may be substituted for the acids with similar but, of course, far less pronounced effects..
4. The same results as those above stated are also to be obtained if the solution of gold is feebly alkalinized with an alkaline bicarbonate.
5. No such deposit occurs if the auric chloride or bicarbonate is replaced by an alkaline aurate.
6. A large sheet of gold in the auric chloride, coupled with a small sheet of gold in the same solution and of the same strength, deposits gold on the small sheet.
7. With gold in a weak solution of the auric chloride, as against gold in a strong solution of this salt, this metal is precipitated on the gold in the strong solution.
8. If gold or platina in auric chloride be connected with platina or gold that is in good contact with any ordinary soil it receives a deposit of bright solid gold thereon in a few hours, while the metal that is in the soil becomes coated with a thin but continuous film of peroxide of iron in most cases.
9. Gold in an alkaline solution is electro-positive to gold in acid solutions generally.

In every case the gold or the platina that stood in the auric chloride solution was coated with wax to well below the surface of the liquid, to guard against any irregular deposit of gold brought about by differences in the surroundings of the metal.

It was proved that the gelatine used for the interpolar connections in these experiments had no part (by its deoxidizing properties) in the production of these metallic deposits.

These results, as a whole, show very clearly that gold can be nuclear to itself in the popular meaning of the term—that, in fact, it can either of itself, or assisted in some way that at present we do not understand, slowly build gold upon gold in that solid coherent form that our nuggets are in. They show, besides, that, whatever the means are by which this is produced, these will exist throughout all the drifts in which native gold occurs. Thus, any particle or nugget of gold lying in the bed, or partly in the bed, of a stream that contains gold in solution will certainly become coated with gold, and this because it is in such a position that the upper and lower surfaces of it are in a saline solution of a different nature, the water being acidic from the presence of free carbonic acid, while the sand and earth are more or less alkaline, the alkaline solution, as we have seen, being especially favourable to the liberation of gold from acid solutions of it. This liberation is a chemical act, and therefore is accompanied by an electric current, by which the gold is electro-deposited on the upper part of the particle or nugget of gold.

All this signifies that for the deposition of gold we have here there must be the “seed-gold,” or auriferous nuclei, to start with; but it is not necessary to go to the reef for this. In any strong proto-compound of iron or metallic sulphide, or even organic matter, we have in conjunction with

\* Trans. N.Z. Inst., vol. viii., page 332.

† Watt's Dic. Chemistry, 2nd supplement, page 444.



such auriferous water the means to insure the small particles—the nuclei, the seed-gold—necessary for this metallic accretion.

Thus far I have carefully restricted myself to showing the single fact that particles and nuggets of gold in our drifts must generally enlarge by the accretion of gold thereon from its solution in the waters which permeate these drifts: the question as to how these accretions are effected, or, rather, what initiates the process, I have abstained from trenching upon; but this question I now, in due course, discuss.

We have seen that during these deposits of gold that I have shown to occur under the conditions here cited currents of electricity are generated—that, in fact, it is by these currents that the gold is deposited in the concrete—the massive form in which nuggets are in. All I have to do, then, is to show how these currents are produced.

I will note here, in the first place, that these currents are of a different class to those described by Professors Becquerel and Gauguin, which are currents produced by immersing the plates of platina in different physical conditions into acid or alkaline solutions or distilled water, and are acknowledged by these investigators to be merely ephemeral, and so are not of that determined character necessary for the work here demanded of them.

Now, in our Transactions for 1875 I showed that platina in an alkaline solution is electrically positive to platina in an acid or in a neutral solution. The currents, however, obtained in this way appear to be like those treated by Professor Becquerel, above described; but I found that if the platina in the alkaline solution were coupled with platina or gold in nitric acid or in auric chloride the electric current was not of an ephemeral character, but, on the other hand, was regular and continuous, so long as there was nitric acid or the gold salt present. The currents, then, may properly be termed permanent, and, being so, the difficulty of accounting for them appears greater than in the case of Professor Becquerel's currents, for they cannot be properly referred to any polarisation of the surfaces of the metals or to any condensation of gas thereon, as he supposes takes place for the production of his currents, but they demand the even, the constant, expenditure of some power, and which, under the circumstances, must involve chemical action, and this absolutely contiguous to the metal—at least, to one of the metals—that is, to one of the poles used. Being so, then the only thing left to do is to determine what are the two substances to which this chemical is due, and what substances form this chemical combination in the immediate vicinity of the metal. Now, it is quite certain that neither of these substances is the platina or the gold itself, for they do not suffer, to any determinate extent, loss during the reaction, nor can they be oxidized except very superficially. (See addenda for further notes on this matter.)

The chemical action, then, that is necessary to produce the current must be produced in one of the three following ways:—

1. By the (chemical) combination of the free oxygen and nitrogen gases present as air at the surface of the metal.
2. By the oxidation of nitrogen by the oxygen of the water.
3. By the oxidation of the alkali or the acid present by the oxygen of water.

Now, in regard to the first theory, it has to be considered that the deposition of gold in these cases being, as we have seen, an electrolytic effect, an electrolysis of both solutions is demanded, and I cannot see how the mere combination of oxygen and nitrogen could effect this; the only result would be a minute production of heat.

We have therefore, as I conceive, only the two remaining theories to consider, and, as both involve a decomposition of water, it is only a question whether the nitrogen gas present is oxidized, or the potash is oxidized to the binoxide, or the acid is further oxidized by the oxygen of the water so as to produce the chemical action—the electrolytic effect—that we require. This question I have to leave for the present undetermined for want of leisure and suitable apparatus, but I shall take the matter up again shortly, and the results of this further investigation. I will acquaint you with in due course; meanwhile I will here describe the results of two experiments made to settle the question.

Two platina plates, one in a gold solution the other in a potash solution, were connected through a galvanometer, and the deviation of the needle marked when it had attained constancy. A stream of oxygen was then passed through the potash solution, when it was ascertained that the deflection of that needle was neither notably increased nor decreased, a fact that appears to prove that it is not the nitrogen which is oxidized.

In another experiment I found that the potash solution had not bleached organic matters—litmus paper, &c.—at all, even after the deposition of gold had extended over eight hours.

These results are conflicting. However, these experiments are merely of a tentative character; but, as I say, I hope very soon to be able to make further and complete investigations on the subject.

There is one circumstance in connection with the alleged discovery of Mr. Daintree of a nuclear action of gold for gold as liberated by organic matter from its chloride that, in conclusion, I would like to make a few observations upon, and this in justice to the memory of that scientist. It may be remembered by some here that I did not hesitate to avow a certain amount of incredulity as to the alleged growth of the particle of gold that Mr. Daintree left in the solution of gold that he had prepared; but just lately, in further considering the case in connection with the facts that I have here stated before you, I could not but think that probably, after all, this scientist's statement as to a certain palpable increase in the size of this gold residue might be correct. The question was, then, if correct, to what was this increase due? Now, it did not appear very likely, under the circumstances, that all this increase was due to differences in the strength or nature of the solution itself whereby action would, as we have seen, be set up; so it occurred to me to try whether or not contact of the gold with the vessel itself had anything to do with it. Binding, therefore, some clean platina wires round small pieces of white porcelain, glass, and white quartz respectively, I

placed these pairs in the trichloride of gold, while a similar wire I wrapped in filter-paper and immersed in the same solution of gold, when in four hours I observed that the wires that were attached to the porcelain and glass were feebly gilded, whilst that attached to the quartz was thickly gilded, but the wire unattached did not exhibit any trace of gold thereon. Gold in place of platina in these experiments also accretes gold to itself, which is clearly revealed by the altered appearance that in a few hours it presented.

As the quartz was of the pure white variety I was led at first to suppose that it at least possessed the same property in relation to the electro-deposition of gold above noted as the noble metals do, but I soon ascertained that this was simply owing to the presence in the quartz of a minute proportion of some proto-compound of iron, for on igniting the quartz, or digesting it with hydrochloric acid before placing it (as wired with platina) in the solution of gold, the gold was deposited upon the wire. The same negative results occurred in the case of the glass when similarly treated prior to the immersion.

These results, as I think, clearly show that any gold that had deposited upon the normal gold in the case that Mr. Daintree gives us had in greater part, if not wholly, been electro-deposited there by means of a chemical combination set up by the oxidation of the protoxide of iron of the glass vessel upon which that normal or original piece of gold lay.

The fact that the whitest and purest quartz at my disposal did, when thus coupled with platina or gold, become solidly gilded when placed in an auric-chloride solution is, I think, rather a remarkable one, for the quartz thus appears to act as the positive pole of an electric circuit. Had it not thus acted we should have had the gold liberated from the auriferous salt by the oxidation of iron deposited in minute disconnected granules on and partly in the body of the quartz, in place of the reguline deposit on the metal attached thereto, as in my results.

In regard to this, some here may contend that the general idea is that all bodies are electric conductors in the same sense that the metals are, but it seems to me that if this were really the case we should be able to electro-deposit gold on quartz, which, as I said above, I have been unable to do. The whole matter, however, requires further research. Meanwhile we have the knowledge that particles and nuggets of gold in auric chloride do increase their size when they have full contact with quartz, glass, and siliceous substances generally that contain ferrous oxide, and this circumstance fully explains how any small increase which obtained in the size of Mr. Daintree's residual gold was brought about.

#### *Addenda.*

The following facts may prove interesting, and also useful, for enabling one to understand some of the phenomena above described :—

If a piece of pure bituminous coal is immersed in a weak solution of auric chloride, and rested clear of the containing vessel—say, on filter-paper—no deposit of gold occurs on the coal; but if this coal is allowed to have contact with quartz, earthenware, or glass, in a short time it will be tinged brown near the junction of the two solids, and in a few hours the whole of the coal is well gilded. Here it is shown that the coal is a pretty fair conductor of weak electric currents.

If pure platina be coupled with pure gold in equal-sized plates in an auric-chloride solution no deposit of gold occurs—at least, I found none; a fact which goes towards proving that these metals in all the experiments I describe here only act as inert poles—as mere “ways and means” for the passage of electric currents.

The electric current is stronger when the gold in the potash is paired with gold in auric chloride than with gold in hydrochloric acid, a circumstance no doubt due to the easier decomposition of the gold salts than the acid.

When the platina of a zinc-platina couple is connected with a platina pole in the alkali solution, and the zinc of this couple is connected with the other platina pole (that which is in the gold solution), the deposition of gold on the platina is not stopped, but only retarded. Using a copper-zinc couple instead of the zinc-platina one, the rate of the deposition of gold is but little, if at all, affected.

A copper-zinc couple in sulphuric acid connected with two gold plates in the auric-chloride solution deposits gold only at a very slow rate, and this even when the copper and zinc plates are much larger than the gold plates.

From the results above stated it appears that the electro-motive power yielded by potash and auric chloride with gold or platina plates is of considerable strength—at any rate, is stronger than that given by the copper-zinc couple in sulphuric acid.

NOTE.—Since the above paper was read I have ascertained that the statements in chemical works as to “gelatine not being appreciably soluble in water” are not absolutely correct. It therefore follows that in some of the experiments I have described gold has been reduced from my solutions by this substance—gelatine, as used in making the necessary electrical connections. The first question, then, is to determine the proportion of gold that was liberated by the gelatine so used. A few tentative experiments showed that when using filter-paper, Swedish or asbestos, both well washed, for the electrical connections, and common spring water to make up the solutions, gold deposits were obtained about as rapidly as before, but by using distilled water to make up my solutions only very slight deposits of gold were obtained, so slight, indeed, that they might well have formed by the aid of organic matter derived from the dust or living organisms derived from the air. This requires further investigation. Anyway, the results of this paper clearly show that whenever the metal gold is in natural waters, containing gold in solution, it will become coated with reguline gold if only there are the conditions present that can insure the electrical polarisation of that metal, such as its contact with solutions of different strength of a somewhat dissimilar nature.—WILLIAM SKEY.



## A REMARKABLE MINERAL WATER.

[Memorandum regarding a Carmine-coloured Water (No. 8124/L) from Stinking Creek, Marlborough, to the Under-Secretary for Mines. By WILLIAM SKEY.]

On the 14th March, 1898, I had a mineral water sent to me by the Secretary of the Department of Agriculture. It proved to be such a remarkable one that it was not before I had certain proofs that it occurred naturally as alleged in the advices accompanying it that I examined it to the length that I now have.

This water, as I have hitherto had it, varies from a pale to a rich carmine colour, and it keeps persistently turbid for some weeks. It has a strong saline taste and a feeble odour of sulphuretted hydrogen. The proportion of fixed salts found in it was 3.51 per cent. thereon, and this is mainly sodic chloride. It therefore classifies with the chlorinated waters of our text-books, and, indeed, so far as I have as yet been able to get results upon the very limited quantity at my disposal, they show that it compares very well with certain of our sea waters in every way except for the presence of the substance to which its singular colour is due. This substance is quite insoluble in water (hot or cold), but is easily soluble in alcohol, ether, and benzol; and feebly soluble in alkalinized waters, but precipitated therefrom by excess of acids generally. It remains in suspension in water along with the clayey matters, but does not appear to be combined with these matters (as a lake), as particles of it burn entirely away.

Taking all these facts into due consideration, one must look upon this substance as being a resin, and most probably in the series of acid or oxygenated resins. Particulars as to the nature of the surroundings of this spring will be collected for publication, and a complete analysis of the water will be made and reported on as soon as a sufficient quantity of it is to hand for the purpose. It is just probable that this spring passes over a bed of rock-salt; also probable that the red colour that some of our rock-salts have is owing to a red resin such as the one here described; and, further, that the blue colour of the rock-salt of Stassfurt is due to the presence therein of a finely divided coloured resin.

I reserve further remarks for a future occasion.

The Secretary for Agriculture, Wellington.

I beg to forward a sample of water brought to this office to-day by Mr. Jackson, chemist, which was procured from Stinking Creek, Awatere, this morning. Mr. Jackson would be glad to ascertain the analysis of same. The water is as taken from the creek, no colouring matter having been introduced.

Blenheim, 10th March, 1898.

JOHN MOORE, Stock Inspector.

Inspector Moore, Blenheim.

ATTACHED please find Analyst's report on sample of water forwarded per Mr. Richardson. Kindly see Mr. Skey's remarks, and say if the sample sent is in its natural condition. At same time please forward larger sample—say, about a quart.

23rd March, 1898.

R. EVATT, pro. Secretary.

*Mineral Water of a Full Pink Hue.*

This is a highly saline water, and belongs to the class of mineral waters known as the chlorinated waters. The colouring matter is organic, with a mordant of alumina. It resembles cochineal. I have no knowledge of any natural water occurring that is coloured like this water; so, before I fully analyse the water, I would like to be certain that it is natural and unsophisticated water.

15th March, 1898.

WILLIAM SKEY, Analyst to the Mines Department.

*Pink Mineral Water from Stinking Creek, Awatere.*

The Secretary for Agriculture, Wellington.

THE sample forwarded for analysis was natural water as taken from the creek, and has had no colouring matter added. I have written to request Agent McKenzie to take a clean quart bottle to the creek, fill, and bring it in himself, and will forward on receipt.

Blenheim, 24th March, 1898.

JOHN MOORE, Stock Inspector.

The Secretary for Agriculture, Wellington.

I HAVE forwarded by mail this day two bottles containing water from Stinking Creek—one perfectly colourless, but containing fibrous roots, watercress; I think the other taken from the stream a mile below the spring-head and highly coloured, as in case of last sample forwarded. These samples may be depended on as natural, as taken from the creek and put into a clean bottle.

Blenheim, 4th April, 1898.

JOHN MOORE, Inspector of Stock.

## THE RELATIVE STRENGTH OF WROUGHT-IRON AND STEEL PIPE.

[From the *Engineering and Mining Journal*, New York.]

An investigation into the relative strength of wrought-iron and steel pipe was recently made by Professor Henry M. Howe at the instance of the National Tube-work Company, and the results of these tests have been made public. Three points were included in the trials, the resistance to bursting under pressure, the tensile strength, and the friction, or resistance to the pressure of water. In each three classes of pipes were tried, 2 in. line pipes, 2 in. tubes, and 5½ in. casing. The steel pipes were made at the National Tube-works, and were taken from the ordinary market stock; the wrought-iron pipes were obtained from three makers of good standing, and also represented the usual stock quality.

\* See copies of letters.

In the bursting tests fifty-one wrought-iron and thirty-six steel pipes were subjected to hydraulic pressure, the results being summed up in the accompanying table:—

TESTS OF WROUGHT-IRON AND STEEL PIPES.

Size of Pipe.	Weight in Pounds per Running Foot.						Bursting-pressure, Pounds per Sq. Inch.					
	Wrought Iron.			Steel.			Wrought Iron.			Steel.		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
2 in. line pipe ...	3·105	3·702	3·452	3·331	4·073	3·821	1,000	4,000	2,918	2,300	6,000	4,733
2 in. tubing ...	3·592	3·995	3·864	3·739	3·961	3·840	3,300	5,000	4,106	5,150	6,000	5,800
5½ in. casing ...	8·991	10·417	10·003	9·293	10·328	9·824	250	1,400	931	1,450	2,750	2,038

Size of Pipe.	Tensile Strength, Pounds per Sq. Inch Section.					
	Wrought Iron.			Steel.		
	Min.	Max.	Av.	Min.	Max.	Av.
2 in. line pipe ...	43,107	53,809	50,002	63,025	67,586	65,999
2 in. tubing ...	47,244	55,074	51,852	60,370	66,495	63,057
5½ in. casing ...	47,312	61,309	54,311	75,931	91,591	82,325

This shows that the bursting-strength of the steel pipes of the three classes tested exceeded that of wrought-iron by 62 per cent., 84 per cent., and 119 per cent. respectively. These percentages should probably be increased, as twelve pieces of the steel pipe did not burst under a pressure of 6,000 lb., the highest measured. Comparing the minimum strength of the two classes, the weakest iron 2 in. line pipe was found less than one-half as strong as the worst steel one; the worst 2 in. iron tube had only 64 per cent. of the strength of the worst steel; while six out of sixteen of the 5½ in. iron casings were only from one-sixth to one-half as strong as the weakest steel ones.

The 2 in. steel pipes were slightly heavier than the wrought-iron pipe of the same diameter, but the difference in weight was far too small to account for the great difference in strength. The tensile tests were made on eleven steel and eleven wrought-iron pipes, and the results are given in the accompanying table. The steel showed tensile strength greater by 32 per cent. in the 2 in. pipe, 22 per cent. in the 2 in. tubes, and 52 per cent. in the 5½ in. casing. The results do not call for special remarks.

The friction tests are described by Professor Howe as follows: "These were of two kinds, scraper tests and hydraulic tests. The scraper tests were made by drawing through each of ten steel and twelve wrought-iron pipes a steel boiler-tube scraper under a constant pull and noting how fast it travelled. In the hydraulic test I coupled together six 2 in. steel pipes in one lot about 104 ft. long, and six 2 in. wrought-iron pipes in another lot of the same length. Through each 104 ft. lot thus made I then ran water at full hydrant pressure, and also at lower pressure, and noted in each case the loss of pressure of water in travelling the length of the pipe. This loss of pressure gives us a measure of the friction in each 104 ft. lot. In the scraper tests neither metal has a decided advantage over the other. In many cases, owing to the lightness of the pull used, the scraper was arrested by the friction of the surface of the pipe after it had travelled only part of the measured distance. As regards the proportion of the arrests thus caused the steel stands somewhat better than the wrought iron, the arrests being 34 per cent. of the total number of trials for steel against 44 per cent. for wrought iron. On the other hand, on a general average of those cases in which the scraper was drawn through without arrest, the velocity of travel was rather greater in the wrought-iron than in the steel pipes. But as this leaves out of consideration all the cases in which the scraper was arrested, and thus did not give sufficient weight to the rougher pipes of each class, and as the number of arrests thus left out of consideration was greater in case of wrought-iron pipes than in the case of the steel ones, these averages give an undue advantage to the wrought-iron pipes. In the hydraulic tests the steel showed a constant and pretty uniform superiority to the wrought iron. For given initial pressure the final pressure is on an average of 0·1 lb. per square inch greater in case of steel pipe than in case of wrought-iron pipe. In other words, for given initial pressure the final pressure is about 5 per cent. greater in case of steel than in that of wrought iron."

In the resistance to bursting-strain, which is the most important point in the investigation, Professor Howe's conclusions are strongly in favour of the steel pipe. In his summing-up on this point he says, "Whether we compare the average of the worst of the steel and wrought-iron pipes together, we find that the steel excels the wrought iron very greatly; so greatly, indeed, and so uniformly, that we may safely conclude that steel pipe resists bursting much better than the wrought-iron pipes of the brands which I examined. The explanation of the very great superiority of the steel pipe over the wrought iron pipe is twofold: First, that the bursting-strength of a pipe is limited by the strength of the metal across the grain, and that, while wrought iron is very weak across the grain, steel is nearly as strong across as along the grain. It is natural that, owing to the extreme weakness of wrought iron across the grain, pipes made of it should be very deficient in

bursting strength. Second, that the steel used welds so thoroughly that the pipe as a whole gets the benefit of the fact that the steel of which it is made is much stronger than wrought iron. This inference agrees with other facts, of which I will refer to two: First, of the twenty-three steel pipes which burst at all, 17·4 per cent. burst elsewhere than at the weld, showing that in these cases the weld was not the weakest place in the pipe. Second, in a German investigation into the strength of nineteen welded boiler-flues made of soft steel like yours it was found that the weld was practically as strong as the solid metal. Here the strength of the weld was on an average 99·3 per cent. of the strength of the solid unwelded metal, the weakest weld being 91·9 per cent. as strong, and the strongest 109·3 per cent. as strong, as the solid metal."

#### ORE-TREATMENT IN BOULDER COUNTY, COLORADO.

The following paper, written for the *Engineering and Mining Journal* by C. C. Burgher, may be of interest now that attention is being directed to telluride-ores in the Australian Colonies:—

The ores of this county may be conveniently divided into two classes—tellurium and sulphide. The districts producing them are in general quite distinct and separated by a porphyry dyke. The sulphide-ores, containing iron and copper sulphides, are mostly confined to the Ward district, and their treatment comprises the usual methods of stamping and concentration. Here and there through the county some lead-silver ore is obtained, which goes direct to the sampling-works and smelters.

The tellurium-ores consist of the various tellurium minerals, marcassite and some pyrite disseminated through a calcareous and magnesia gangue. Sylvanite and petzite are the principal tellurium minerals found, though calaverite, hessite, lead telluride, nickel telluride, bismuth telluride, and iron tellurate are frequently met with. Little or no silver is found in the lower grades of this class of ore. In the early days of the county, when nothing less than 4 oz. or 5 oz. ore was looked for or shipped, the question of treatment was not considered; but, as in other localities, of late years the question of economic milling of the ore at the mine has arisen. The outcome of this feeling was the erection of over twenty mills scattered throughout the county, most of which are now lying idle from various causes. Some of them are closed owing to differences between the owners, but the great majority of them were ill-advised ventures, resulting in a plant unsuited to the ore, or so badly constructed as to be an economic failure. Concentration and cyanidation seem to have been the most favoured methods of treatment. As is well known, it is not possible to satisfactorily concentrate tellurium-ores; when such material is crushed through a 20- to 40-mesh screen the values will float off any vanner or concentrating-machine ever devised. The cyanide-mills have met with very poor success in Boulder County, with one or two exceptions, where the ore was decomposed and the gold entirely free. The ores must be crushed finely for cyanide treatment, and the lime, magnesium, and aluminium compounds render leaching nearly if not quite impossible. As most of the ores carry sulphur and tellurium an efficient roasting is absolutely required before even a fair extraction can be obtained with potassium-cyanide solution.

The Delano Mining and Milling Company, when seeking to find a process thoroughly suitable to the ores in question, after carefully examining most of the different mills in Colorado, in particular those of the Cripple Creek district, decided to erect a 50-ton chlorination plant. The mill<sup>\*</sup> has now been in operation six months, and has demonstrated that it is a metallurgical and economic success, and that chlorination is a process well adapted to the treatment of tellurium-ores. The general arrangement and operation of the mill is as follows: The crushing, roasting, and chlorination houses are erected on level ground, the ore being handled by elevator-belts and belt and screw conveyors. The advantage of having a compact mill all on one floor is obvious. The different elevators and conveyors have worked very satisfactorily, and have cost little or nothing for repairs as yet.

The ore is delivered to a 9 in. by 15 in. Blake crusher, elevated to a set of coarse rolls 16 in. by 36 in., set to  $\frac{1}{4}$  in. The ore leaving the rolls slides along a chute in which a horizontally moving plate is set, provided with a slot one-tenth of the width of the chute. As the ore passes over the plate one-tenth of it is delivered on the floor as a sample, the balance going to the bedding-floor. The sample thus obtained is split, shovelled, recrushed, and again cut down to a suitable size for the sample-room. Here it is ground in a coffee-mill, finishing on a bucking-board, until all of it will pass a 120-mesh sieve. On most of the ores this degree of fineness seems necessary in order to get results that will closely check. The bedding-floor used at present is simply a utilisation of unoccupied floor-space in the crusher-house. The writer, on taking charge of the mill, soon found a bedding-floor to be indispensable, there being no method as practical and convenient for mixing widely different ores. The bedded ore is elevated to storage-bins, thence allowed to pass through a cylindrical dryer divided by longitudinal partitions into four compartments so as to obtain as much heating surface as possible. The dried ore is elevated to the screens, 16-mesh, the over-size being returned to two sets of fine crushing-rolls, size 14 in. by 30 in., the discharge from the rolls falling into the same elevator as the dried ore, thence to screens. The latter, conical in shape and set horizontally, are placed over bins of 25 tons capacity each. All bins are made of heavy sheet iron supported by substantial framework. The rolls used in the crushing and sampling department are known as the Rogers roll. Their distinguishing features are great strength and general compactness, one shell being placed above the other, not vertically, but at such an angle as to throw all the weight possible of the upper roll on to the ore. The upper roll works in a guide against a powerful spring. The speed of the coarse rolls is seventeen revolutions per minute; that of

\* The mill and its chlorinating machinery which the article describes were designed and successfully run by Mr. John E. Rothwell, of Denver, Colorado, the well-known authority on chlorination of gold-ores.

the fine thirty revolutions, this low speed varying as the diameter gives a circumferential speed nearly equal to the speed of the falling ore. The result of this is that there is no dragging nor grinding of the ore, but simply a cracking. The importance of this feature in not producing slimes cannot be overestimated.

A table of mesh determinations made of an average sample of ore is as follows, the size of screen being 16-mesh (heavy rolled wire). The screens through which the sample was passed were all of fine wire, and there was little difference in size between the 16-mesh mill-screen and the 20-mesh sample screen:—

						Per Cent.
Stayed on 20-mesh	...	...	...	...	...	3.7
Stayed on 30-mesh	...	...	...	...	...	34
Stayed on 40-mesh	...	...	...	...	...	16
Stayed on 60-mesh	...	...	...	...	...	16
Stayed on 80-mesh	...	...	...	...	...	9
Stayed on 100-mesh	...	...	...	...	...	6.2
Through 100-mesh	...	...	...	...	...	15.1
Total	...	...	...	...	...	100.0

It will be noticed that the proportion of fine material is relatively small.

All belts used in the crushing-house for elevating ore are of "Leviathan" belting (made of prepared cotton duck), with one exception. This belting seems little or no worse for five months' wear, while one 8 in. 4-ply rubber belt has been nearly cut to pieces in the same time. The hard, tough, yet non-cracking surface of the "Leviathan" belt seems to make it an ideal conveyor of ore.

Every precaution is taken in the sampling and crushing department to avoid the sometimes considerable loss in dust. All ore is dampened before being crushed, the floors are sprinkled with water two or three times to each shift. The discharges from the fine rolls, elevator to screens, screen-bins, &c., are all connected with an exhaust-fan which delivers the dust into a hopper, from which it may be drawn off as desired.

From the screen-bins the ore is carried on a belt conveyor provided with flanged sides to the feed-hopper of a 40 ft. diameter Pearce turret roaster, similar in general design to those used elsewhere, except that the latest improvement in cooling the rabble-arms by water instead of air is made use of. Accompanying this innovation forged-steel teeth are employed for stirring the ore in place of the usual blades. These improvements are of very great advantage; no useless cold air is admitted to an ore that needs little air but very great heat; the arms retain their shape, being comparatively unaffected by the heat; while the teeth will last a year or two, thus doing away with the expense and annoyance of putting in a set of arms every week or so. In roasting concentrates, sulphides, &c., the deterioration of the air-cooled arm is not nearly so rapid, and the air is a very necessary adjunct; but in roasting such ore as is under discussion a very great heat is required—far greater than the former ores would stand without melting. With the old style of rabble-arm and blades any slight variation in the relative height of each arm above the hearth will cause an unequal distribution of the ore, and it will pile up either on the outside or inside of the hearth, resulting, of course, in an imperfect roast; with the forged-steel teeth this never occurs, each tooth seeming to act independently of every other one. The teeth are shaped in the form of a plough-share. They were at first used in a nearly flat form, but they had a tendency to carry raw ore around the hearth in one revolution. As soon as the present angular shape was adopted they gave perfect satisfaction. The furnace is provided with three fire-boxes; Northern Colorado or lignite coal is the fuel employed, occasionally mixed with Rock Springs coal if necessary.

A feature of the roasting department that deserves especial attention is that the roasted ore as it leaves the hearth is automatically cooled, carried in a screw conveyor to the boot of an elevator, which delivers it to the hoppers above the chlorination-barrels. The cooler consists of an iron box set in the hearth at the point of discharge, provided with 2 in. tubes, through which the ore is gradually drawn down to a feeding-plate—actuated by trips on the moving gear on the roaster—into a screw conveyor which delivers, as stated above, to an elevator leading to the chlorination-house. The cooling is accomplished by keeping the tubes surrounded by cold water. This device, during six months' actual work, has proved itself to be a thorough practical success. It does away with the first cost of a cooling-floor and the great expense for labour in moving 50 tons of ore every twenty-four hours. It is true that the ore is not delivered absolutely cold from the cooler, but it has never been hot enough to damage the elevator-belt or to cause the least anxiety as to fire. Water is allowed to drip on the ore at several points as it passes through the screw conveyor, the quantity being adjusted so as to just keep the dust down and not wet the ore so that it will not discharge from the elevator. This serves as a further protection against fire.

The chlorination-house comprises five floors set vertically above each other. On the top are three 5-ton hoppers; on the floor below are set three 5-ton lead-lined barrels of the usual type, except that they are provided with Rothwell's sand filter—illustrated and described in the *Engineering and Mining Journal* of the 19th October, 1895—instead of asbestos. The filter consists of a layer of coarse quartz 6 in. deep, kept in place by a slotted wooden bottom and a perforated lead sheet on top; the whole is securely braced and held in place by 2 in. by 6 in. slats wedged tightly under wooden strips bolted to the barrel. Through this medium, using 20 lb. to 40 lb. water-pressure, a charge can be filtered in from sixty to ninety minutes. The sand at first used was far too fine, and it was found necessary to use 2-mesh quartz, the idea being to let some of the slimes through, getting rid of them in the settling-tanks, and thus prevent the filter from clogging up.

Below the barrels are the solution-tanks, four in number, each of capacity sufficient to hold the solution from 25 tons of ore. On the same floor are likewise two settling-tanks and two precipitating-tanks of the same capacity. The use of a Montejus tank for transferring the solution

is discontinued, being replaced by an application of the Pohle air-pump. All four of the solution-tanks are connected underneath by a 3 in. lead pipe, which joins a pipe of similar size leading down under the floor below (to give the solution a certain amount of head), then turning and leading up, over, and into the settling-tanks. Just beyond the lower elbow a lead air-pipe is introduced. When it is desired to move the solution the method of procedure is as follows: The valves of the solution-tanks are opened, allowing the liquid to flow through the piping, air-pressure is turned on, and the rising bubbles of air suck the solution along with them. The operation is entirely automatic and requires little or no attention. The second settling-tanks and the precipitating-tanks are connected by a similar continuance.

All solution is allowed to stand twelve hours in the solution-tanks and twelve hours in the second settling-tanks before being pumped over for precipitation, thus insuring the complete settling of all slimes. Precipitation of the gold is accomplished by the use of sulphur-dioxide and hydrogen-sulphide, the resulting sulphides being collected in a filter-press, dried, roasted, and melted.

Some metallurgical features developed in actual working may be of interest. Before taking charge of the mill the writer had been informed that Boulder County ores should be roasted at a very low heat, not only on account of the loss of gold by volatilisation along with the tellurium, but because marcasite and the ferro-tellurides were so apt to form non-porous black oxide of iron under a high heat. The latter condition does not seem to have been attained any more than in roasting iron-pyrite. A very careful and exhaustive system of checking by bullion returns and by assays shows that there has not been any appreciable loss by volatilisation since the mill started. An average of all daily assays made on ore entering and leaving the roaster has shown a slight increase in value instead of a loss, as it should, owing to the loss in weight incurred in roasting. This increment is 0.03 oz. on 1 oz. to 3 oz. ore. It was at first deemed necessary to maintain a moderate fire in the first fire-box of the roaster, and apply the greater part of the heat through the second and third box. This practice was found to diminish the capacity; the three fire-boxes are now fired alike, and are crowded to the utmost, a steam-jet being used under the grates to aid combustion. The average contents in sulphur of the ore treated has been 2.5 per cent.; this must be reduced to a trace or a few hundredths to give a 95-per-cent. extraction. Hence the necessity of a very great heat. In the light of our experience here, remembering also that nearly every member of the tellurium family has occurred in the ore treated, it would seem that the loss of gold in roasting tellurium-ores has been overrated, certainly on material ranging from 1 oz. to 3 oz. in value. Occasional lots of even much higher grade have been treated without any sensible loss.

After numerous experiments, the least amount of chemicals that was safe to use was found to be 10 lb. chloride of lime and 15 lb. sulphuric acid 66° for the barrel-charge per ton of ore; and  $\frac{1}{2}$  lb. sulphur,  $\frac{3}{4}$  lb. iron-sulphide, and 1 $\frac{1}{2}$  lb. sulphuric acid per ton for precipitation.

#### TEMPERATURE IN AMALGAMATION.

[From the *Engineering and Mining Journal*, New York.]

Some months ago Mr. Thomas J. Grier, manager of the Homestake Company's mines in the Black Hills, in South Dakota, ascertained by experiment that the cooling of the water used in the stamp-mill batteries very considerably increased the yield of gold from the Homestake ore. The difference was in the saving of the fine gold—the coarse gold taking care of itself—which was apparently much greater at lower than at higher temperatures. The facts, as communicated to us through the courtesy of Dr. Franklin R. Carpenter, of Deadwood, are that two batteries side by side were run upon the same ore, one with the water at a temperature of about 50 deg. Fahr., and the other at a higher temperature of 60 deg. to 70 deg. There was no possible doubt of the increased yield from the colder battery. It was supposed that more fine gold amalgamated at the lower temperature—the coarse gold not being lost at any temperature. Mr. Grier desired to make the facts public for the benefit of mill-men, and we do so with much pleasure, hoping to draw out discussion on the causes of this difference, as well as notes of the experience in other mills.

The first theory propounded by those to whom the facts were submitted was that at the lower temperature there was either less oxidation of the mercury or that there was less decomposition of iron-pyrites or other minerals contained in the ore to foul the quicksilver. Either of these causes would, of course, interfere with the amalgamation of the fine gold. In answer to a suggestion that in warming the water by waste steam small particles of oil might be carried to the batteries, Dr. Carpenter obtained from Mr. Allan J. Clark, assayer for the company, a statement that the mill water, while the higher temperature was used, was never in contact with any oil or grease. The steam from the cylinders was passed through a series of pipes, with which the mill water was held in contact for a period of time sufficient to give the desired temperature. The condensed steam was discarded.

Mr. Clark also added to the facts in the case the statements, from his personal observations, that in the Golden Star Mill the water of a single battery was cooled by contact with pipes containing a freezing mixture placed immediately below the first row of plates, so that the water on the second row of this battery was about 10 deg. Fahr. below that on the adjacent plates presumably receiving the same quality of ore. The recovery of amalgam was decidedly better than from the other plates. In the Highland plate-house (third row plates) the recovery of amalgam would diminish during a period of warm weather, and perhaps for twenty-four hours after.

There seems to be no doubt about the correctness of Mr. Grier's observations, nor about the fact that better results were obtained in amalgamating Homestake ore when the water was at a temperature of 50 deg. than when it was at 60 deg. or over. Whether the explanation is that given above, whether there is really a temperature at which the affinity of quicksilver for gold is at a maximum or whether the effect is only mechanical, does not seem to be decided.

Some light may be thrown upon the question by experience in other places, and in this connection we find the following statements in Mr. T. A. Rickard's "Stamp-milling of Gold-ores," pages 125, 126, the first reference being to Australian practice: "At the Britannia United, on Bakery Hill, in Ballarat, the water used in the batteries is warm, and is made so by conducting the condenser water of the engine into the tank which supplies the mill. Two points open to discussion are here suggested, the use of warm water and the addition of lime. The object of heating the battery water in such a warm climate as that of Ballarat does not appear very evident. The use of condenser water in any mill is decidedly objectionable. To consider these two propositions, let us take first the effects of warm water upon amalgamation. At the alluvial mines of the mountains of the interior of Otago, New Zealand, the use of mercury, the good friend of the miner all the world over, is hardly known, and the explanation given is that mercury will not act in the cold climate of that region. This is due to the use of hot water in cleaning up at both mines and mills. The idea is, of course, quite an erroneous one, though there is a substratum of truth in it, from the fact that amalgamation is usually assisted by heat and retarded by cold, but within narrow limits only. The amalgamation of gold, not silver, in ordinary stamp-milling, not pans, is here discussed. On the other hand, at Black Hawk, at over 8,000 ft. above the sea-level, in the bitter cold of the Colorado winters, the mill-men will tell you that cold weather is better for amalgamation upon the plates than summer heat. Why? Because heat thins the amalgam, and the vibration of the mill, due to the falling stamps, causes the globules of mercury to run off and down the surface of the amalgamating-tables, while cold (which thickens the amalgam) tends to keep it in position. From one point of view hot water is to be recommended. Slimes which will float on cold water will sink in warm water, owing to the expansion of the air bubbles, which float the fine dust and are the *raison d'être* of the slimes. On the whole, however, while amalgamation (and here the amalgamation of gold is the only question discussed) is assisted by heat, yet below the temperature of boiling water the effects of a small rise are so slight that it is doubtful if the use of warm water is to be advised in ordinary gold stamp-milling. It is certainly not to be recommended in summer at a locality having the climate of Ballarat, and therefore its use at the Britannia United is to be objected to. (At the time referred to it was summer, and the temperature outside the mill 82 deg. Fahr.)"

The excellent paper on the "Amalgamation of Free-milling Gold-ores," by Mr. Louis Janin, jun., in "The Mineral Industry," vol. iii., has brief references only to this question. Thus he says, on pages 328 and 343: "Some mill-men believe in heating the battery water, but it would seem doubtful if this can produce any result other than to create a fluid amalgam. The plates in particular are softer when warm water is used, but this is a doubtful advantage. If the water be heated at all it should not be done by the direct application of the exhaust steam, as is explained elsewhere. A peculiarity of amalgam is that it contains more gold in winter than in summer. This is due undoubtedly to the warmer water in summer making the amalgam more fluid. The difference ordinarily is slight. Amalgam that retorts 40 per cent. in summer may retort 45 per cent. in winter."

The experience reported by Mr. Allan J. Clark in the Homestake Mill itself points rather to the theory that the effect is chiefly mechanical. In the cases reported by him the amalgam from the third row of plates is softer than that of the first row—it rarely retorts over 20 to 22 per cent., as against 35 to 37 per cent., and after standing for some time after squeezing it assumes a more or less liquid condition—the material collected during two weeks after coming down to the assay-office for retorting, fully 75 per cent. in liquid form, with a few pasty lumps included in it. Moreover, this condition has not been so noticeable during the winter months as it was during the summer and autumn. In this case the colder water, by hardening or stiffening the amalgam, may prevent scouring, and so give higher results.

Mr. Reed, amalgamator at the Golden Star Mill, experimented with a battery that had been worked for some time on water at 56 deg. Fahr. Before leaving the mill one evening he changed it to 70 deg. Fahr.—at this time the plates being covered with amalgam—and next morning at 7 o'clock much of this had washed off, small wedges remaining where the brushes had broken the even surface of the amalgam; at 11 a.m. these had disappeared, and the plate was almost bare. This was a silver plate; the copper-plate of the first row showed no such changes in working when the temperature is varied. Mr. Reed adds that he has only occasionally observed any evidences of chemical action when using warmer water, a black scum showing on the surface of the plate when it is gently rubbed with the hand.

So far, therefore, the weight of testimony seems to be rather in favour of the mechanical effect. The experience of mill-men in other localities may point to different theories, however; it would at any rate be of value. Mr. Grier's discovery is suggestive, and it is quite possible that it might be of advantage to pay more attention to the temperature of the water than has heretofore been done in many places.

#### PATENT RIGHTS GRANTED.

#### AN IMPROVED PROCESS FOR EXTRACTING GOLD FROM ORES, MINERALS, AND OTHER GOLD-BEARING SUBSTANCES.

We, James Gow Black, of Dunedin, in the Colony of New Zealand, Professor of Chemistry in the University of Otago, and Robert Challen Skeet, of Oamaru, in the Colony of New Zealand, do hereby declare the nature of our invention for "An improved Process for extracting Gold from Ores, Minerals, and other Gold-bearing Substances," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—



This invention relates to processes used for obtaining gold from ores, minerals, and other gold-bearing substances, and its object is to obtain the gold in a rapid, efficient, and inexpensive manner.

The invention is carried into effect by treating the ore or other gold-bearing substance, after it has been reduced to a powder in any well-known manner, with a dilute solution containing about from 10 lb. to 20 lb. of strong sulphuric acid (oil of vitriol), about from 12 lb. to 20 lb. of chloride of sodium (common salt), and about from 5 oz. to 9 oz. of permanganate of potash, in about 100 gallons of water.

A solution of from a quarter of the above strength to four times the above strength is serviceable in extracting the gold, but we prefer the strength as above.

Bisulphate of soda may be used instead of sulphuric acid, but in the proportion of about two and a half parts by weight of the bisulphate instead of one part by weight of the acid. Chloride of calcium, or chloride of potassium, or chloride of ammonium, or chloride of magnesium, or other suitable chlorides may be used instead of chloride of sodium, in their equivalent proportions.

The manner in which the solvent is prepared is as follows: (1.) Mix together 50 gallons of fresh water and from 10 lb. to 20 lb. of sulphuric acid. (2.) Mix together 50 gallons of fresh water, 12 lb. to 20 lb. of chloride of sodium, and from 5 oz. to 9 oz. of permanganate of potash. These two mixtures are mixed together to form a dissolving liquor, which must be used within twenty-four hours to keep its strength. It is advisable to keep the two mixtures apart until they are required for use.

Manganate of potash, or permanganate of soda, or manganate of soda may be used instead of permanganate of potash, but if manganates are used about 40 per cent. more will be required and about a third more of the sulphuric acid.

Ores or other gold-bearing substances containing pyrites or arsenical pyrites, or other sulphides or arsenides, or tellurides, or selenides, or antimonides, or organical substances, must be thoroughly roasted before treatment with the solution.

In carrying out the invention any suitable apparatus may be used, but we prefer to provide tanks wherein to mix the solution, which tanks are of any convenient shape, and of any desired size, according to the quantity of the solution to be made. In one tank we mix fresh water and strong sulphuric acid, in the proportion previously given of 50 gallons of water to from 10 lb. to 20 lb. of acid, the water to be put into the tank before the acid, the mixture to be stirred while the acid is being put in, so as to insure a thorough mixture. In another tank we dissolve and mix permanganate of potash and chloride of sodium in fresh water, in the proportion previously given of from 5 oz. to 9 oz. of permanganate of potash and from 12 lb. to 20 lb. of chloride of sodium in 50 gallons of water. The two mixtures are mixed together in another tank to form the dissolving liquor, which must be employed within twenty-four hours to keep its strength, as previously stated.

The raw or roasted ore or other gold-bearing substance, in a finely powdered condition, is put into leaching-tanks having a false bottom, fixed at about 1 in. to 2 in. above the true bottom, and perforated with holes of about 1 in. in diameter and 6 in. to 10 in. apart. On this false bottom is placed a filter-bed of quartz pebbles and sand about 6 in. deep, larger pebbles resting immediately on the false bottom, with smaller pebbles above, the size gradually diminishing upwards, with coarse sand above and finally fine sand at the top. All the above tanks may be lined with enamelled iron, glazed earthenware, or a preparation of paraffin or other material upon which the solvent will not act. The leaching-tanks are filled to within about 10 in. of the top with raw or roasted ore or other gold-bearing substance, in a finely powdered condition, and the solvent solution is then added gradually until it stands at a depth of about 6 in. above the surface of the ore. A stop-cock communicating with the space between the two bottoms is afterwards opened, when the solution which will have filtered or percolated through the filter-bed and false bottom is drawn off into precipitating-tanks, which are preferably made of wood. The tanks may be of any convenient size or shape, and lined as previously described. Instead of such filter-bed, the false bottom may be covered with any suitable textile material (such as asbestos) as will allow the liquid to pass through freely, and will not decolourise the purple-red colour of the permanganate solution.

As it is necessary that the dissolving solution should be in contact with every particle of ore, it is necessary or desirable to agitate the mixture in the leaching-tanks to secure such contact. After agitation and standing some time—from about twelve to seventy-two hours, or longer if necessary, according to the coarseness of the particles of gold—the solution is drawn off into precipitating-tanks by opening a stop-cock communicating with the space between the two bottoms.

Should the reddish-violet colour of the solutions become faint or vanish during leaching, then more of the solution must be added; but so long as the solution retains its reddish-violet colour it may be used for dissolving gold.

The methods of precipitating gold are well known, and the sulphurous-acid or the ferrous-sulphate solution is preferred. By this invention the gold is dissolved rapidly as soon as the solution comes into contact with it, the gold taking the chlorine of the salt, whilst the sulphuric acid in the presence of the nascent oxygen from the permanganate takes the soda and the potash from the common salt and the permanganate respectively, the reaction thus being a case of concurrent attraction or affinity, therefore specific.

We do not claim as part of our invention the use of the permanganates or manganates of potash or of soda in the above solution, but only the use of sulphuric acid and chloride of sodium in combination with the permanganates or manganates.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is,—

1. The improved process for extracting gold from ores, minerals, or other gold-bearing substances consisting in submitting such ores, minerals, or other gold-bearing substances in a powdered condition to the action of a dilute solution containing sulphuric acid, chloride of sodium, permanganates or manganates of potash, and water, substantially as described.

2. The improved process for extracting gold from ores, minerals, or other gold-bearing substances consisting in submitting such ores, minerals, or other gold-bearing substances in a powdered condition to the action of a dilute solution containing sulphuric acid, chloride of sodium, permanganates or manganates of soda, and water, substantially as set forth.

3. In a process for extracting gold from ores, minerals, or other gold-bearing substances, a solvent solution prepared by mixing, and composed of fresh water and sulphuric acid in the proportion of 50 gallons of water to 10 lb. to 20 lb. of sulphuric acid, and then mixing such solution with fresh water, chloride of sodium, and permanganates of potash in the proportion of 50 gallons of water to 12 lb. to 20 lb. of chloride of sodium and 5 oz. to 9 oz. of permanganates of potash, substantially as set forth.

4. In a process for extracting gold from ores, minerals, or other gold-bearing substances, consisting in submitting such ores, minerals, or other gold-bearing substances in a powdered condition to the action of a dilute solution containing sulphuric acid, chloride of sodium or other suitable chloride, permanganates or manganates of potash or of soda, and water, substantially as set forth.

Dated this 28th day of August, 1897.

W. E. HUGHES,  
Agent for the Applicants.

#### A NEW PROCESS FOR THE TREATMENT OF GOLD AND AURIFEROUS ORES, ENTITLED "ETARD'S GOLD-DISSOLVENT."

I, Alexander Etard, of 14, Rue Monsieur le Prince, Paris, France, chemist, engineer, and professor of sciences, do hereby declare the nature of my invention for "A New Process for the Treatment of Gold and Auriferous Ores, entitled 'Etard's Gold-dissolvent,'" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to processes used for obtaining gold from ores or auriferous minerals or substances, and its object is to obtain the gold in a rapid, efficient, and inexpensive manner.

The invention is carried into effect by treating the ore, after it has been reduced to a powder in any well-known manner, with a dilute solution containing about 45 lb. to 66 lb. of strong commercial hydrochloric acid and about 12 oz. to 16 oz. of permanganate of potash per cubic metre of water (one cubic metre of water being equal to 35.32 cubic feet), or, in other words, about 45 lb. to 66 lb. of strong commercial hydrochloric acid and about 12 oz. to 16 oz. of permanganate of potash in every 2,207 lb. of water. Solutions of from a quarter of the above strength to four times the above strength are serviceable, but I prefer the strength as above, the solvent solution to be made up as follows: (1.) Mix together—fresh water, 100 gallons; ordinary hydrochloric acid, 40 lb. to 60 lb. (2.) Mix together—fresh water, 100 gallons; permanganate of potash, 12 oz. to 16 oz. These two mixtures are mixed together to form a dissolving liquor, which must be used within twenty-four hours to keep its strength. It would be advisable to keep the two mixtures apart until they are required for use.

Manganate of potash or permanganate or manganate of soda may be used instead of permanganate of potash, but so that 20 oz. of manganate of potash or 11 oz. of permanganate of soda or 17 oz. of manganate of soda shall be used in place of 12 oz. of permanganate of potash; and, if manganates are used, about a third more of hydrochloric acid will be required.

Ores or other auriferous substances containing sulphur, tellurium, selenium, arsenic, antimony, pyrites, or organical substances must be thoroughly roasted before treatment with the solution.

In carrying out the invention any suitable apparatus may be used, but I prefer to provide tanks wherein to mix the solution, which tanks are of any convenient shape and of any desired size, according to the quantity of solution to be made. In one tank I mix fresh water and strong commercial hydrochloric acid, in the proportion previously given of 100 gallons of water to 40 lb. or 60 lb. of acid. In another tank I dissolve and mix permanganate of potash in fresh water, in the proportion previously given of 12 oz. to 16 oz. of potash to 100 gallons of water.

These two mixtures are mixed in another tank, to form the dissolving liquor, which must be employed within twenty-four hours to keep its strength, as previously stated.

The raw or roasted ore or other auriferous substance is put into leaching-tanks having a false bottom, fixed at about 1 in. or 2 in. above the true bottom, and perforated with holes of about  $\frac{1}{2}$  in. in diameter, and 6 in. to 10 in. apart. On this false bottom is placed a filter-bed of quartz pebbles and sand about 6 in. deep, larger pebbles resting immediately on the false bottom, with smaller pebbles above, the size gradually diminishing upwards, with coarse sand above, and finally fine sand at the top.

Instead of such filter-bed the false bottom may be covered with any suitable textile material (such as asbestos) as will allow the liquid to pass through freely, and will not decolourise the purple-red colour of the permanganate solution.

The leaching-vats are filled to within about 10 in. of the top with the raw or roasted ore or other auriferous substance in a finely powdered condition, and the solvent solution is then added until there is a depth of about 6 in. above the surface of the ore. All the above tanks may be lined with enamelled iron, glazed earthenware, a preparation of paraffin, or any material which will not affect the permanganate solution. A stop-cock communicating with the space between the two bottoms is afterwards opened, when the solution which will have filtered or percolated through the filter-bed and false bottom is drawn off into precipitating-tanks, which are preferably made of wood. The tanks may be of any convenient size and shape.

As it is necessary that the dissolving solution should be in contact with every particle of the ore it is necessary or desirable to agitate the mixture in the leaching-tanks to secure such contact. After agitation and standing some time—from about twelve to seventy-two hours, or longer if necessary, according to the coarseness of the particles of gold—the solution is drawn off into the precipitating-tanks by opening a stop-cock communicating with the space between the two bottoms.



Should the reddish-violet colour of the solutions become faint or vanish during leaching, then more of the solution must be added, but so long as the solution retains its reddish-violet colour it may be used for dissolving gold.

The methods of precipitating gold are well known, and the sulphurous-acid or the ferrous-sulphate solution is preferred.

By this invention the gold is dissolved rapidly as soon as the solution comes into contact with it. The nascent oxygen or ozone from the permanganate unites with the hydrogen of the hydrochloric acid, whilst the gold at the same time unites with the chlorine of the acid, the permanganate and the acid thus concurring to effect the solution of the gold, the reaction being an example of concurrent affinity or attraction (sometimes called "catalytic action"), and in this respect differing from the well-known chlorination processes. The reaction is therefore specific.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The improved process for extracting gold from ores consisting in submitting such ores in a powdered condition to the action of a dilute solution containing hydrochloric acid, permanganate or manganate of potash, and water, substantially as described.

2. The improved process for extracting gold from ores consisting in submitting such ores in a powdered condition to the action of a dilute solution containing hydrochloric acid, permanganates or manganates of soda, and water, substantially as described.

Dated this 28th day of August, 1897.

W. E. HUGHES,  
Agent for the Applicant.

#### AN IMPROVED APPARATUS FOR THE TREATMENT OF SLIMES AND TAILINGS TO EXTRACT THE PRECIOUS METALS THEREFROM.

I, Thomas James Denny, of 29, Great George Street, Westminster, in the County of Middlesex, engineer, do hereby declare the nature of my invention for "An Improved Apparatus for the Treatment of Slimes and Tailings to extract the Precious Metals therefrom," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to an improved apparatus for the treatment of slimes and tailings formed in the reduction of ores to extract the precious metals therefrom.

It is designed with the object of providing a simpler and more efficient plant for this purpose, cheaper both in original outlay and also in actual working-expenses than those generally in use at present; to avoid handling of the slimes when subjecting them to treatment, and to enable the treatment to be carried out continuously.

It consists of an apparatus composed of a series of precipitating- or settling-vats, and mixing- or solution-chambers, each vat being provided with a pipe led upwards through the bottom of the vat, projecting internally to a point of discharge within the vat below the surface of the water, which point of discharge is variable as the density of the outflowing pulp, and which said pipe is preferably fitted with a wide or bell-shaped mouth; the water or cyanide solution, as the case may be, escapes along an overflow- or discharge-launders at the top of the vat, while at the bottom of the vat is a regulating stop-cock or valve to enable the slimes, which have been settled, to be drawn off into a cylinder or vessel into which cyanide solution is introduced with or without pressure for the solution of the gold; compressed air may also be admitted in order to agitate the mixture thoroughly.

In practice I find it advantageous to have a direct connection between the vat and the mixing-chamber, thus making the latter an entirely closed vessel.

The apparatus will be more fully described with reference to the accompanying drawings, in which Fig. 1 is a front elevation showing arrangement of my apparatus, Fig. 2 an end sectional elevation of mixing-chamber G, and Fig. 3 a sectional plan of my apparatus. A is a circular tank or vat, constructed of iron, wood, or other suitable material, the lower portion of which is preferably of a conical section; D is a pipe leading from the spitzkasten or spitzluten, or other discharge of slimes and tailings (or either), from a battery into the vat A, so arranged that its outlet shall be in an upward vertical direction from a point near the bottom of the vat or tank; this inlet-pipe D is preferably provided with a wide or bell-shaped mouth E to better disseminate the pulp as it flows into the vat; a funnel X is suspended, mouth downwards, in the vat, so arranged that its mouth shall be just above the mouth of the inlet-pipe D, the stem or tube J of the said funnel being of a length sufficient to project above the level of the sides of the vat. Around the inner periphery of the top of the vat A an overflow-launders C is arranged. At the bottom of the vat A an outlet is provided with a cock F, affixed so that the outflow may be regulated to any desired degree. The said outflow is arranged immediately above the opening G<sup>1</sup> in the mixing-chamber G, which chamber is constructed preferably with a sloping bottom, as shown in Fig. 1, at the lower end of which is attached the outflow-pipe D<sup>1</sup>. H is a pipe leading into the said mixing-chamber G, through which cyanide solution may be introduced, while K K are inlets through which compressed air may be admitted. The outlet-pipe D<sup>1</sup> from the mixing-chamber G leads, in precisely the same manner as the intake-pipe D, already described, into a second vat or tank A<sup>1</sup> of precisely similar construction and arrangement as A.

It is obvious that the series of settling-vats A and mixing-chambers G may be of any desired number according to the treatment to which it is desired to subject the pulp.

The method of working the apparatus may be described as follows:—

The pulp from the spitzkasten, spitzluten, or launders is fed into the vat A through the pipe D, and outflows thereinto in a gentle upward stream, the effect of which is to settle or precipitate the particles, allowing only the pure water to overflow through the launders C. This action

is accounted for by the well-known fact that a rising column of water has a tendency to leave behind or settle all suspended matter. Moreover, the pressure exerted by the superincumbent water in the vat also tends to rapidly settle the slimes. The precipitation of the particles is accelerated by the employment of the inverted funnel X as already described, against which the incoming flow of slimes is projected.

The slimes or tailings as they are precipitated pass through the outlet F into the mixing-chamber G, where the cyanide solution is introduced through H and compressed air admitted through K K. The employment of compressed air is solely for the purpose of thoroughly agitating the mixture of slimes or tailings and cyanide solution, and in nowise for the purpose of providing additional oxygen, the application of which I am well aware to be old.

The mixture of slimes and cyanide solution passes from the mixing-chamber G through pipes D<sup>1</sup> into the vat A<sup>1</sup>, where the same operation is automatically performed as in the first tank A, with the difference, however, that, whereas in the former case water overflows by the launder C, in the latter cyanide solution escapes and is conveyed to the extractor-boxes, where the gold in solution is recovered.

The precipitated slimes are then drawn off into any convenient sump, where they may be again washed with water, or, if desired, into a third separation-vat for the purpose of waterwashing to recover any cyanide solution which may be remaining therein.

The special and economical features of the hereinbefore described apparatus are that—(1) The whole treatment, from the time the slimes are taken over by the slimes-treatment apparatus until finally discharged into the sumps, is entirely automatic and continuous; (2) the cyanide solution is thoroughly incorporated with the slimes without any stirring or mixing other than that automatically effected by the compressed air; (3) the whole apparatus needs no attention when once the various cocks have been properly regulated.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, a precipitating-vat with the supply-pipe so arranged that its delivery is in an upward direction beneath the surface of the water or liquids, so as to cause the mixture to assume a gentle rising motion in its passage through the vat and out at the overflow, substantially as hereinbefore described and illustrated on the accompanying drawings.

2. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, a precipitating-vat A in combination with the inflow-pipe D provided with the bell-shaped mouth E, the inverted funnel X having the hollow stem or tube J, the bottom discharged with the outflow-cock F and the overflow-launder C, substantially as hereinbefore described and illustrated on the accompanying drawings.

3. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, a vessel or chamber G, into which the slimes or tailings are introduced through the opening G<sup>1</sup> and the pipes H and K, for the admission respectively of cyanide solution and compressed air, substantially as hereinbefore described and illustrated on the accompanying drawings.

4. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, the combination of a precipitating-vat as referred to in claims 1 and 2 with the mixing vessel or chamber referred to in claim 3, substantially as hereinbefore described and illustrated on the accompanying drawings.

5. An apparatus for the treatment of slimes and tailings to extract the precious metals therefrom arranged substantially as hereinbefore described and illustrated on the accompanying drawings.

W. E. HUGHES,

Agent for the Applicant.

Dated this 14th day of April, 1898.

#### IMPROVEMENTS IN OR RELATING TO THE TREATMENT OF ORES AND IN APPARATUS THEREFOR.

I, Elizabeth Barnston Parnell, of Gillmon House, West Street, Carshalton, Surrey, England, do hereby declare the nature of my invention for improvements in or relating to the treatment of ores and in an apparatus therefor, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the treatment of ores, its object being to extract the base metals from auriferous or argentiferous ores, leaving the gold and silver clean and free in the gangue, from which they can be recovered by any of the well-known solvents.

In carrying out my process the ore under treatment should first be crushed and concentrated by any of the well-known means, or preferably by means of the improved concentrator according to this invention. This improved concentrator comprises one or more wells in the surface of an oscillating table, with a slightly sloping surface, upon which the crushed ore is delivered, and over which a stream of water flows.

The water in the well or wells is kept in a state of perturbation or agitation by means of a "douche," which consists of streams of water or air delivered from suitable nozzles into the water. The nozzles preferably dip below the surface of the water to be agitated, as their action is then found to be greatly improved. The table should also preferably carry at its higher end an amalgamated plate, and a quicksilver well placed at the lower end of the amalgamated plate. A second plate may advantageously be added below the quicksilver well just referred to. When several water wells with "douches" are employed the crushed ore is by their action automatically "classified" in order of coarseness, the particles retained in the first well being the coarsest. Together with the hereinbefore-mentioned amalgamated plate and quicksilver well, the apparatus thus constructed acts at the same time as an amalgamator, concentrator, and "classifier."

The concentrated ore is next subjected to the oxidizing action of ozone, nascent oxygen, or other powerful oxidizing agent, which may be produced chemically or electrically, but I have found

a convenient method is to mix a suitable portion of chromic acid or other oxygen-producing agent with the concentrated ore. This treatment will partially oxidize and decompose the ore, and prepare it for roasting.

The ore which has thus been treated is next passed into a roasting-furnace, and may be conveyed backwards and forwards by a suitable conveyor until the roasting process is complete.

The furnace may be constructed from iron plates bolted together and arranged preferably to form a triangle in section—though I do not confine myself to this form—and adapted to carry a muffle-hearth.

The upper angle forms a flue-way for the fumes evolved from the roasting ore; the two lower angles form flues for the fire, which thus passes on each side (beneath the half-muffle) to the stack.

The furnace can be converted to a reverberatory by directing the flame over, instead of beneath, the hearth.

After roasting, the ore, if acid, may be neutralised with an alkali, such as ordinary ammonia or the waste ammoniacal liquors from gasworks, although caustic soda, or other suitable alkali, may be employed. The ore now passes into an extractor, which is preferably, though not necessarily, of cylindrical form, and may be made of any suitable material. In this extractor the ore is "boiled" with water at a considerable pressure. I have found from two to four atmospheres to give satisfactory results; and this has the effect of dissolving out the base constituents of the ore more effectually than occurs at the ordinary boiling temperature, leaving the ore in a fit condition to be acted upon by solvents for the extraction of the precious metals contained therein.

In extracting soluble sulphates from ore it is advantageous to keep the ore in motion, and for this purpose the extractor may be seated on a rocker actuated by cams, or other device worked by gearing; when the rocker is in motion the ore in the extractor will be thrown from end to end, and every particle effectually cleansed.

The apparatus employed may be varied without departing from the spirit of my invention, the main features of my system consisting in the oxidation by ozone, nascent oxygen, or other powerful oxidizing agent, aided by roasting and the dissolving-out of the base constituents of the ore thus rendered soluble by steam-pressure preferably exceeding two atmospheres.

Before the ore is subjected to my treatment it should be crushed so as to pass a 40- to 60-mesh screen, and then concentrated in any well-known manner, after which it should be dried. It is then ready for treatment according to this invention, the details of which are as follows:—

The oxidation and decomposition of the ore may be effected in various ways, the time required varying with the means employed. I do not confine myself to any one means, but may use ozone chemically or electrically produced, or I may employ hydrogen-peroxide or other powerful oxidizer. I obtain good results by taking imperfectly dried ore and intimately mixing this damp crushed ore with chromic acid, and, when the mixture has been thoroughly effected in suitable vessels, the vessels and their contents are covered and allowed to stand for, say, ten to twelve hours. The result is a partial oxidation and decomposition of the sulphides, which are partially transformed into sulphates, and thus prepared for roasting. While powerful oxidizers or ozonizers have been employed theretofore in the leaching of ores, the above treatment previous to, and thus preparatory to, roasting which operation is thereby much facilitated and its duration lessened is, to the best of my knowledge, entirely novel and very valuable.

After preparation in the above-described manner the ore is transferred to a furnace of any construction to be roasted, after which it is treated in an extractor as hereinafter described. Although other furnaces and extractors may be employed, I prefer to use a furnace and extractor of the special construction hereinafter described, and of which the accompanying drawings illustrate one form as constructed in accordance with this invention: Fig. 1 being a longitudinal section of a furnace on the line 1-1 of Fig. 2, Fig. 2 a transverse section of the furnace shown in Fig. 1 on the line 2-2 of Fig. 1, Fig. 3 a longitudinal section of an extractor on the line 3-3 of Fig. 4, and Fig. 4 an end elevation of the extractor shown in Fig. 3; Fig. 5 an elevation, and Fig. 6 a plan of a plough used in conjunction with the furnace; Fig. 7 a side elevation; Fig. 8 an end elevation in part section, and Fig. 9 a plan of concentrator according to this invention; Fig. 10 is a perspective view of an improved construction of amalgamating-plate.

With reference first to Figs. 1 and 2, A is a shell, built conveniently of cast-iron, forming a housing, triangular in cross-section, for the hearth, a fire-grate and bridge being provided at A<sup>a</sup> and A<sup>b</sup> respectively.

The hearth is shown at B, extending for the greater part of the length of the housing A, and is preferably of curved form in cross-section, as shown in Fig. 2.

The hearth thus divides the space within the shell into long compartments or flues, three in this case, and one of the most important features of this construction is that the furnace can be made to act as either a muffle or a reverberatory furnace by directing the fire either along the two lower flues, marked A<sup>1</sup>, or along the upper one, marked A<sup>2</sup>. Or the flame may be directed over the charge at the same time that heat from the fire is being directed under the hearth along the two lower flues. I have found this last method of using the furnace of very great efficacy in the roasting of ores giving off arsenical and other volatile or easily oxidizable fumes.

The direction of the heat or flame from the fire along the upper flue or under flues, or along both simultaneously, may be effected by dampers or doors in a well-known manner. The shell, whose iron walls are lettered at *a*, has preferably a suitable lining, as shown at *a*<sup>1</sup>, and the whole shell may be conveniently mounted on brickwork, such a mounting being shown in the drawings and lettered C. The charge of ore already treated, say with chromic acid, is fed on to the hearth B through a hopper A<sup>3</sup>, seen in Fig. 1, and is caused to slowly travel the whole length of the hearth, on reaching the end of which it is discharged into wagons or other receptacles provided. Suitable sight-holes are provided at intervals in the length of the furnace, as are shown at A<sup>4</sup>. The means adopted to convey the charge through the furnace may be of any well-known kind, but I prefer a conveyor of the following special construction:—

*Improved Apparatus  
for treatment of Slimes & Tailings.*

Denny's Patent.

Fig 1.

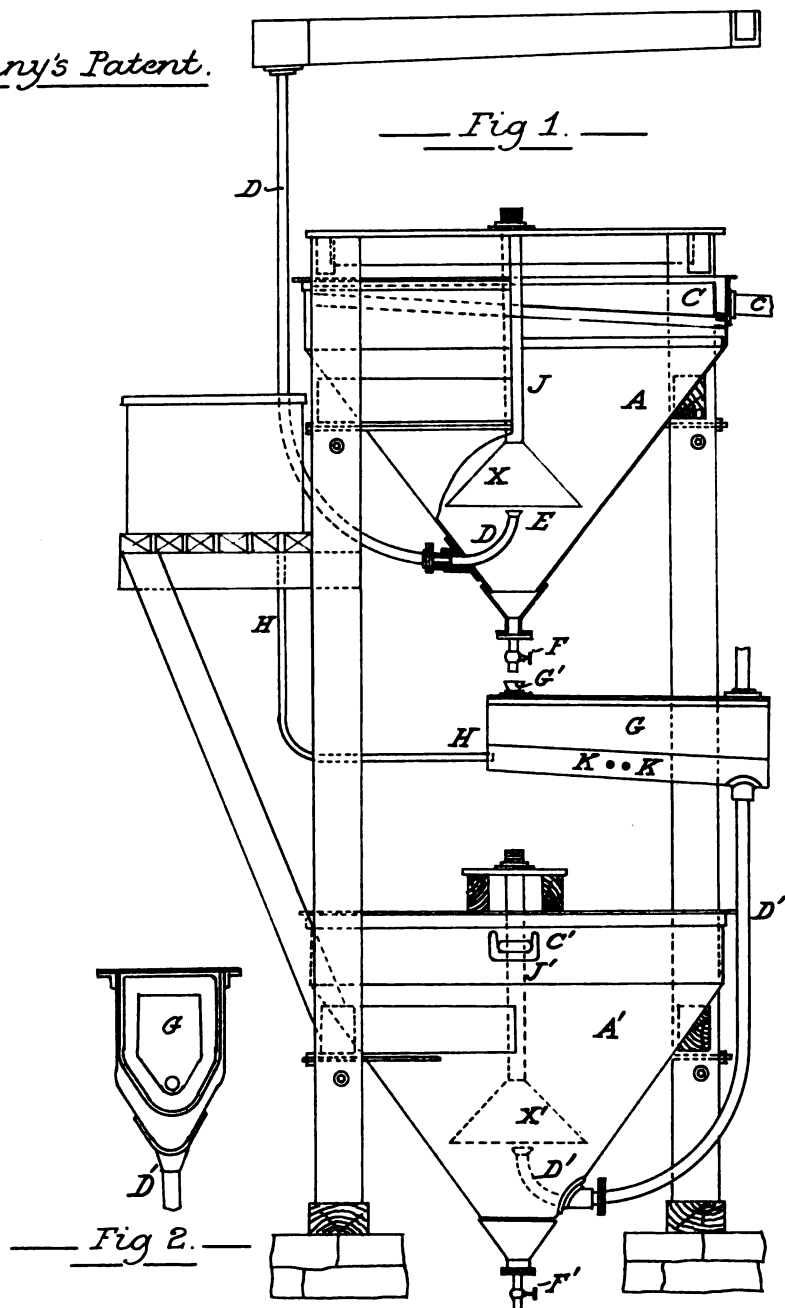


Fig 2.

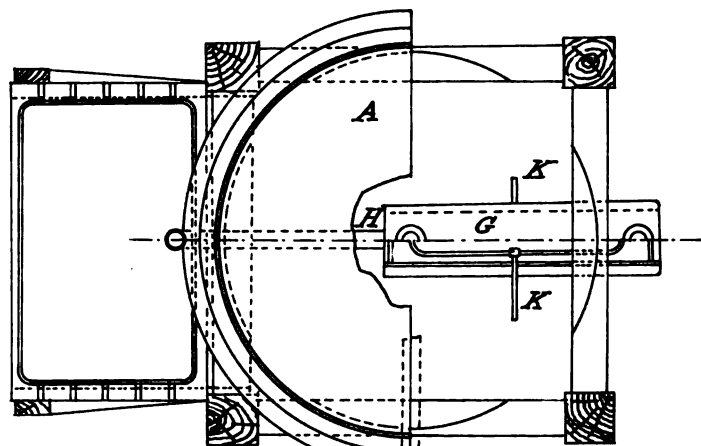
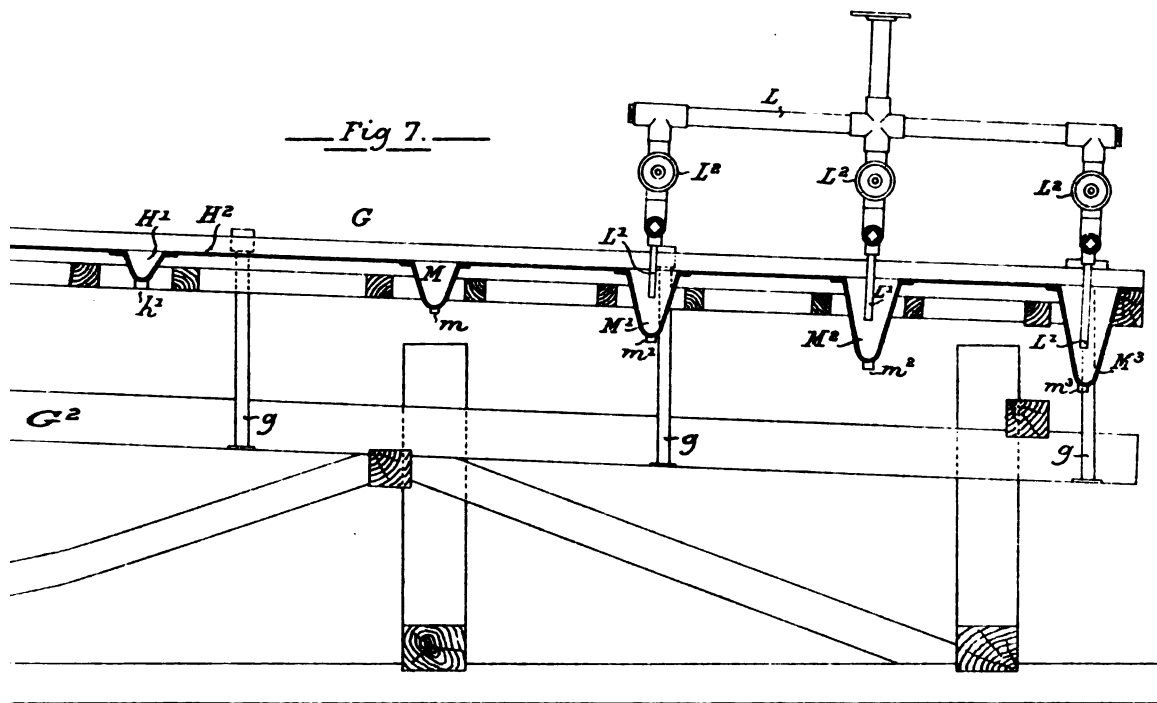


Fig 3.

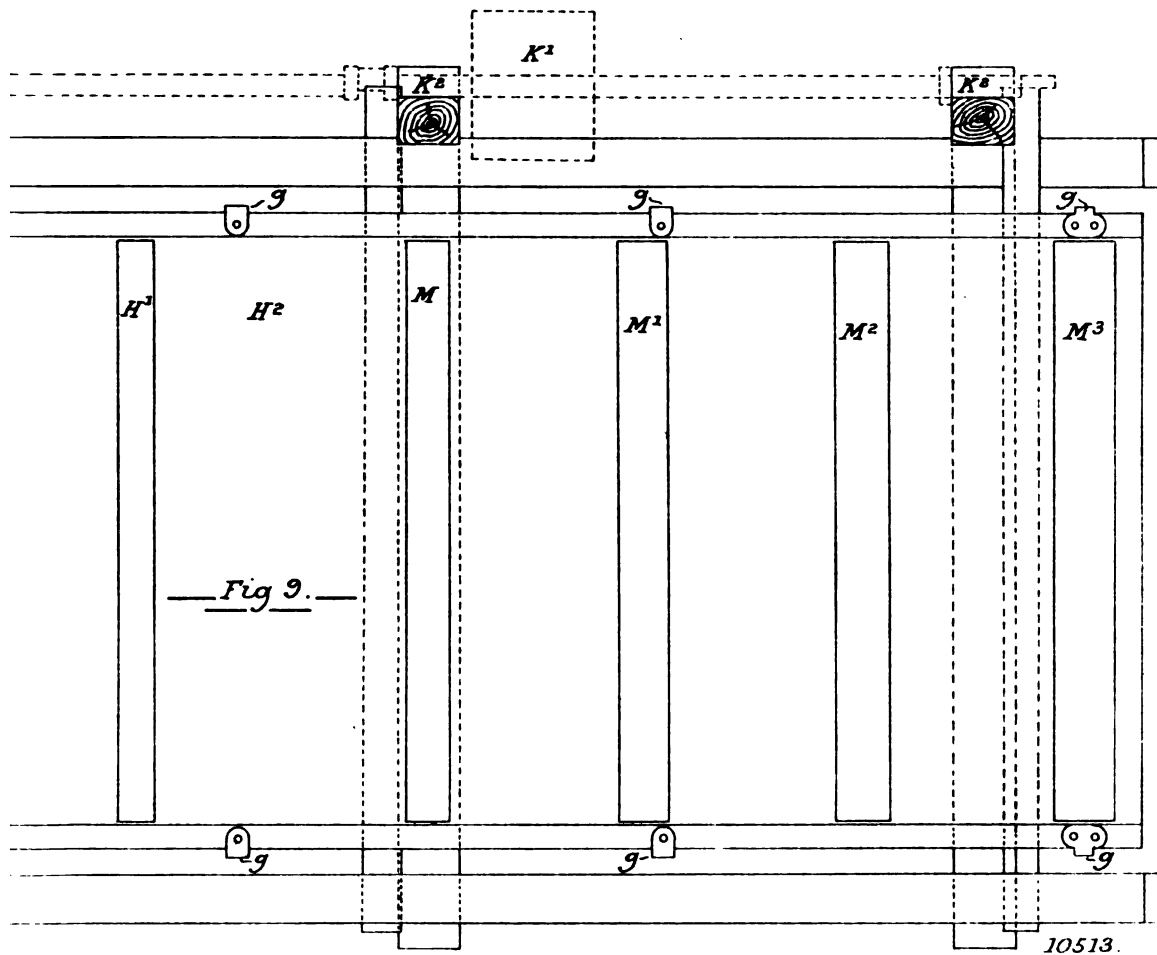
10509.



— Fig 7. —



— Fig 9. —



10513.



One or more endless chains, preferably of cast-iron, and having ploughs or conveyors attached, pass along the hearth from end to end. One such chain is shown at D. At each end where the chain emerges from the furnace it passes over a chain-wheel D<sup>1</sup>, one of which is caused to rotate and drag the chain in a direction from the hopper end to the delivery end of the hearth. A return-way for the chain is provided in the brickwork at C<sup>1</sup>, during passage through which it becomes well cooled. The chain has attached to it at various points ploughs or conveyors adapted to thoroughly stir and "turn" the charge without carrying it too rapidly through the furnace. The ploughs are shown at D<sup>2</sup>, in Figs. 1 and 2, and one is shown to a larger scale in Figs. 5 and 6. In these two figures d<sup>1</sup> are "wings" of the plough, which are the most effective part of the device in bringing fresh portions of the charge to the surface. The speed at which the ploughs move through the charge may be varied to suit different kinds of ores requiring roasting for different periods, the usual time required when the ore has been prepared as hereinbefore described being eight to ten hours.

Provision is made in this furnace for the copious admission of wet steam through nozzles or holes placed as near to the hearth as conveniently possible, so that the steam can play upon the charge during the process of roasting, the steam being required for the formation of sulphates. One form of nozzle is shown in the drawings Figs. 1 and 2, at A<sup>1</sup>, being connected to a steam-pipe A<sup>2</sup> extending along both sides of the shell on the outside. Provision for the admission of air or oxygen is shown at A<sup>3</sup>. The ore should not be heated to a higher temperature than is necessary for the formation of sulphates. When the roasted ore has been discharged into the wagons or other receptacles it may be ground and again roasted, or may be at once treated with alkali, if requiring such treatment, and transferred direct to an extractor. A special form of extractor, constructed according to this invention, is shown in Figs. 3 and 4 of the accompanying drawings. E is a cylindrical vessel, closed at each end, to the inside of whose walls E<sup>1</sup> is attached a lining of, say, copper E<sup>2</sup>, which is not subject to corrosion or the attacks of any chemicals likely to be present in the ore, and capable, in conjunction with the walls E<sup>1</sup>, of withstanding a steam-pressure of several atmospheres within the vessel E. The ore is mixed with water to a cream-like consistency, and the whole introduced into the extractor through a door E<sup>3</sup>.

A steam inlet is provided either by using hollow trunnions or as shown by the steam-pipe E<sup>4</sup>, Figs. 3 and 4, and the charge is "boiled" under a high steam-pressure. I frequently find two to four atmospheres sufficient, though I do not confine myself to this or any particular pressure, but it should not be less than that of the atmosphere. This operation I term "boiling," and "boiling" under high pressure thus has been found by me to effect the extraction far more thoroughly than at ordinary pressure. A steam-gauge and safety-valve may be fitted to the extractor, and are shown at E<sup>5</sup> and E<sup>6</sup> respectively, E<sup>5</sup> being a blow-off cock. The whole vessel E is capable of rotation about an axis transverse to that of the cylinder of which it is formed, and means for oscillating or rocking it about such an axis are provided, as shown in the drawings, F being a crank receiving rotation from a pulley F<sup>1</sup>, driven by any suitable source of power, F<sup>2</sup> being a connecting-rod hinged by one end to the extractor at E<sup>7</sup>, and connected by its other end to the crank. The extractor is mounted in bearings E<sup>8</sup>, which permit of oscillation about the axis F<sup>4</sup>.

The charge is thus thrown to and fro from end to end of the cylinder E, and kept in violent agitation under steam-pressure, the result being to get all the sulphates and other soluble salts thoroughly into solution, the precious metals being subsequently thoroughly separated from the sulphates or "cleaned" by washing in vats in the usual manner. The concentrator G, illustrated in Figs. 7, 8, and 9, comprises a frame G<sup>1</sup> supported upon a stationary frame G<sup>2</sup> by means of flat springs g<sup>1</sup>, so as to be capable of receiving an oscillating motion. Neither the method of supporting the oscillating table nor the means adopted to impart the motion form, however, part of the subject-matter of the present application for patent, any suitable construction or mechanism being used as may be desired. In Figs. 8 and 9 is shown in chain lines a crank-shaft K, with pulley K<sup>1</sup>, mounted on bearings K<sup>2</sup>, by which the desired motion may be imparted to the table through connecting-rods such as K<sup>3</sup>. Above the table is a device which will hereinafter be termed a "douche," and which comprises a water or compressed-air supply-pipe L, communicating with several rows of nozzles L<sup>1</sup>, each of which rows is provided with a valve L<sup>2</sup> to control its supply. This "douche" may be supported in any convenient way, either from one of the frames G<sup>1</sup>, G<sup>2</sup>, or independently of the concentrator itself.

If supported from the frame G<sup>1</sup> a flexible coupling-pipe must be provided to unite the pipe L with the source of supply, in order at the same time to allow of the motion of the frame G<sup>1</sup>. The frame G<sup>1</sup> carries the table G<sup>3</sup> of the concentrator. This table slopes slightly from one end to the other, as is usual in such apparatus, and is provided with side walls G<sup>4</sup> to prevent the material from being carried over the sides. The table is faced with an amalgamated plate H at its upper end. At the lower end of this plate is a well H<sup>1</sup> containing quicksilver, and below this is preferably a second amalgamated plate H<sup>2</sup>. Below these are several wells M, M<sup>1</sup>, M<sup>2</sup>, M<sup>3</sup>, the number in the example illustrated being four. These are termed "pyrites wells," as they are intended to retain the pyrites, and each well is preferably somewhat deeper than that just above it. The wells are also preferably constructed with their sides nearest the higher end of the table vertical, but with their opposite sides sloping. Each well, including the well H<sup>1</sup>, is provided with a draw-off plug, as shown at h<sup>1</sup>, m, m<sup>1</sup>, m<sup>2</sup>, m<sup>3</sup>, respectively. The surface of the table between any two wells is shod with iron or other durable material; the second amalgamated plate H<sup>2</sup> may be replaced by such a plain iron plate, if desired. The walls are advantageously made sloping from end to end, so that the material settling in them is deeper at one end than the other. The amalgamated plate H<sup>1</sup> may have a plain surface, but it is found very advantageous to employ a plate of the construction shown at H<sup>3</sup> in Fig. 10, in which are depressions h arranged in rows, and alternated so that a depression in one row comes below the interval between the two depressions in the preceding row. The operation of the concentrator is as follows: The crushed, or crushed and amalgamated, ore is fed on to the plate H together with a stream of water, the table being maintained in oscillation. The globules of mercury, or of amalgam, and the particles of gold contained in the material are retained by the plate H,



well  $H^1$ , and plate  $H^2$ . The crushed ore is carried on by the flow of water, assisted by the oscillation, to the wells  $M$ ,  $M^1$ ,  $M^2$ , and  $M^3$  in succession, the "douche" maintaining the contents of the wells in a state of agitation, with the result that the packing of the material is avoided, and the heaviest particles settle in the first well, the lighter in the next, and the lighter still in the next, and so on, the lightest worth retaining settling in the last well, while the valueless gangue is carried away over the end of the table.

The contents of the wells may be drawn off periodically by means of the outlet plugs, to which reference has already been made, or a continuous discharge may be obtained by allowing the accumulation of material to force its way through an adjustable opening in the bottom of any or all of the wells. The employment of the plate  $H^2$  obviates a small loss of quicksilver or amalgam, which is sometimes liable to occur owing to the globules leaping the well  $H^1$ , or being in such an extremely fine state of division that they are carried over the well with the water.

When depressions such as  $h$  are present these fine globules are retained therein before they reach the well  $H^1$ , and are unable to leave these depressions until by agglomeration with other retained globules they grow to a size sufficient to enable them to be carried onwards.

The curved, approximately hemispherical depressions employed according to this invention have proved to be most effective in obviating all loss of quicksilver or amalgam during concentration owing to the above-described action. Compressed gas or gases or any desired fluid may be employed in the "douche" in the place of air or water.

When this process has been carefully carried out, and the base metals thus reduced to a minimum in the gangue, it will be found that an extremely small proportion of solvent for the precious metals is required as compared with the solvent required when the gangue has been prepared by other methods now in use, especially when copper is among the base metals to be eliminated and the solvent used is chlorine.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In the treatment of refractory ores subjecting them to an oxidizing and decomposing agent as a preliminary to roasting for the purpose described.
2. In the treatment of refractory ores "boiling" the roasted ore with water under pressure greater than that of the atmosphere for the purpose described.
3. A process of treatment for refractory ores in which they are first oxidized or decomposed, next roasted, and then boiled in water under pressure for the purpose described.
4. In a concentrator for the treatment of metalliferous ore or deposit the combination with one or more amalgamated plates and one or more quicksilver wells of one or more water wells with or without a "douche," substantially as described.
5. The complete process for the treatment of metalliferous ore by which the ore is first crushed, then concentrated, then oxidized or decomposed, then roasted, then "boiled" under high pressure, and lastly subjected to a solution treatment, substantially as described.
6. In a concentrator for the treatment of metalliferous ore or deposit the combination with a water well of an air, water, or other "douche," substantially as described.
7. In an amalgamator for the treatment of metalliferous ore or deposit an amalgamating-plate having depressions such as  $h$ , substantially as and for the purpose described and illustrated in the accompanying drawings.
8. In the treatment of refractory ores a furnace divided by the hearth into flues, and adapted for use either as a muffle or as a reverberatory furnace or as a half-muffle, substantially as described.
9. In the treatment of refractory ores a furnace of substantially triangular form in cross-section divided by the hearth into flues, and adapted for use either as a muffle or as a reverberatory furnace or as a half-muffle, substantially as described.
10. In this treatment of refractory ores a furnace-hearth curved transversely.
11. The combination and arrangement of parts constituting the complete furnace substantially as described and illustrated in Figs. 1 and 2 of the accompanying drawings.
12. In the treatment of refractory ores the combination with a furnace-hearth of one or more ploughs or conveyors such as  $D^2$  constructed and operating substantially as and for the purpose described.

Dated this 3rd day of March, 1898.

ELIZABETH BARNSTON PARNELL.

IMPROVEMENTS IN THE TREATMENT OF ORES, TAILINGS, AND THE LIKE, AND APPARATUS THEREFOR,  
THE INVENTION BEING ALSO IN PART ADAPTED FOR THE TREATMENT OF SEWAGE.

I, John Poole, of Coolgardie, Western Australia, but at present of London, England, mining engineer, do hereby declare the nature of my invention for "Improvements in the Treatment of Ores, Tailings, and the like, and Apparatus therefor, the Invention being also in part adapted for the Treatment of Sewage," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to improvements in the treatment of pulverised ores and to apparatus therefor, the invention being particularly applicable to gold- and silver-bearing ores, tailings, slimes, and the like which are to be treated by cyanide or other like gold and silver solvent solutions, the invention being also in part adapted for the treatment of sewage. In the accompanying drawings is illustrated apparatus forming part of my invention, and for carrying same into effect. In these drawings Fig. 1 is an elevation of same. Fig. 2 is a plan. Fig. 3 is an end view looking from the right hand. Fig. 4 is a part elevation of one set of the settling-tanks employed. Fig. 5 is an elevation on an enlarged scale showing one form of the raking or harrow teeth, and Fig. 6 is an elevation showing another form of tooth. The apparatus is shown as arranged in a suit-

able covered building, and consists of one, two, or more shallow tray-like baths *a* connected at their ends with a common bath *a*<sup>1</sup>, with which communicates a conveyor or bucket-belt *a*<sup>2</sup>. In the baths *a* are rakes or harrows *b*, preferably suspended by flexible connections *c*, such connections (which may be cords, chains, or the like) passing over pulleys and down to winches or other mechanism *d*, by which the harrows may be raised or lowered to suit the amount or quality of material in the bath, such harrows being preferably always suspended, so that they do not touch the bottom, and capable of being raised when required to empty the bath.

A reciprocating movement is given to the harrows by means of the pitmen *e*, connected to the cranks of a shaft *f*, which is suitably rotated from a shaft *f*<sup>1</sup>, driven by a pulley *f*<sup>2</sup>, from a pulley *f*<sup>3</sup>, on a main shaft *f*<sup>4</sup>, driven by suitable engines or motors.

At the ends of the baths *a* are situated a series of similar shallow tray-like baths *g* of larger dimensions, provided also with harrows or rakes *h*, hung on flexible connections *c*<sup>1</sup>, attached to winches *d*<sup>1</sup>, such rakes being operated by pitmen *i* connected to cranks on the shaft *f*<sup>1</sup>. These baths are preferably placed at a slight incline towards one end, where there are situated overflow-chutes *j* *j*<sup>1</sup>, which overhang respectively the end tanks of a series of settling-tanks *k*, *k*<sup>1</sup>, *k*<sup>2</sup>.

These tanks are each provided with pipes *l*, draining into a pipe common to all such pipes *l*, having cocks at different heights placed in the tanks, and communicating therewith. The tanks have also sloping bottoms, indicated at *m*, Fig. 3, communicating with doors *m*<sup>1</sup>, while between each pair of tanks *k* *k* or *k*<sup>1</sup> *k*<sup>1</sup> is a sump or pit, in which works an endless conveyor or bucket-belt *n* *n*<sup>1</sup>, arranged to deliver into troughs or launders *o* *o*<sup>1</sup> having each two spouts or branches passing to the tanks *k*<sup>1</sup> *k*<sup>1</sup> and *k*<sup>2</sup> *k*<sup>2</sup> respectively. Such spouts are provided with dams or doors *p*, as are also the chutes *j* *j*<sup>1</sup> and baths *a* *a*<sup>1</sup>. There are provided also suitable tanks *q* *q* and *r* for the mixing and storage of the cyanide or other dissolving working solutions.

The teeth *s* of the rakes or harrows may be solid or hollow throughout their length, and open at their ends, as shown in Fig. 5, or they may be perforated, as at *s*<sup>1</sup>, Fig. 6, such teeth being connected through pipes with a flexible tube *t*, by which air, liquid, or gases may be forced or introduced into the body or mass of material in the baths.

In carrying out the process the tailings, slimes, pulp from the mill, sands, alluvial or other matter to be treated, and in a more or less finely divided state, is elevated by the conveyor *a*<sup>2</sup> into the bath *a*<sup>1</sup>, supplied with water, and from thence overflows into the baths *a*, where it is subjected to a raking action in the water by the harrows. In these baths *a* any free gold present has an opportunity to settle. If clean and free-milling ores are being treated quicksilver may be placed in the bath to amalgamate the gold. The rest of the pulp is allowed to gradually flow over the ends or edges of the baths into the first bath or vat *g*, in which the pulp or tailings are treated with cyanide, bromine, chlorine, or other desired solutions, and which are continuously supplied to same. These baths are so arranged or inclined that the pulp and solution flow over the edge of the first one into the one next in order, the agitation to which they are subjected, and the large surface which is exposed by reason of the formation of the baths, enabling the pulp with cyanide or like solution to be brought very effectively into contact with the air.

In these baths the fine gold is dissolved, and from them the tailings and solution flow by the chutes *j* or *j*<sup>1</sup> into the tanks *k* *k*, where in due course the gold-bearing solution is drawn off by the pipes *l* and taken to the usual extractor-boxes, where it is treated in the ordinary way. The tailings remain at the bottom of the tank *k* until the door *m*<sup>1</sup> is opened, when it is discharged into the sump, in which works the conveyor *n*, which will raise the tailings and deliver it into the launder *o*, and from thence into the next tanks *k*<sup>1</sup> *k*<sup>1</sup>. This launder *o* may have a studded or ribbed bottom to break up the material, and will have a weak cyanide or like solution or water wash supplied to it. In the first tank the tailings may be deprived of, say, 50 per cent. of its bullion, and in the second tank, which also contains a cyanide or like solution, it will be deprived of, say, 50 per cent., or one-half of the bullion remaining therein, after which the same process may be repeated, the tailings being removed and elevated to the third tanks *k*<sup>2</sup> *k*<sup>2</sup>, and so on, as required to obtain as far as possible all the bullion contained therein, any suitable number or arrangement of tanks being employed, about one-half of the remaining bullion in the tailings being extracted at each operation.

The tanks may be so arranged that one set are being used for settling while another set are being emptied of solution and tailings, as previously described, this being effected by the dams or doors *p*.

By the means above described the coarse as well as the greater portion of the fine gold may be obtained within a few hours of crushing, the remainder being afterwards secured. The water required is considerably less than that used in battery treating, and the loss but little more than the moisture in the residues.

The quantity required in the agitation can be as low as equal weight of tailings or slimes, while the strength of the solution will vary with the ore, but, for example, 0.01 per cent. will work with some slimes.

In treating slimes direct and tailings carrying very fine gold, they may be delivered into the large baths *g* without the intervention of the first bath *a*.

All free-milling ores, sands, and tailings may be leached as formerly, after the agitation as above described, wherever suitable.

Where it is desired to use chlorine gas or the like under pressure, the baths *g* may be provided with gastight covers, and have suitable packing-boxes through which the parts operating the agitating-harrows work.

By this process amalgamation by copper-plates and leaching of the cyanide or other solution is no longer necessary, nor is the presence of slimes to be feared, as the ore may be crushed dry or wet as fine as is possible in order to liberate the whole of the precious metal from the gangue.

A small quantity of lime may be crushed with the ore or mixed in the first or concentrating baths *a*, for the double purpose of neutralising the acids in the ores and for causing a quick precipitation of the solid matter in the settling-tanks. In order to remove the soluble sulphates, acids, salts, and the like, a preliminary water wash may be necessary.

The apparatus is also adapted for treating sewage with air or chemicals, and for the settling and decantation of same.

The process and apparatus is adapted for the treatment of alluvial and beach sands in a similar and direct manner without first pulverising the wash, but by first separating the large stones, pebbles, and the like with a revolving screen or similar means, and then treating the residue as for ordinary tailings.

By means of the process and apparatus above described it will be seen that a comparatively thin body of material is exposed to the action of the cyanide or like solution, that such body of material is being continuously moved, and that the solution itself has a large surface exposed to the air, all these being very desirable features in the working particularly of the cyanide process, and that the treatment is a continuous one, the material passing through the apparatus at a rate which may be regulated by the manner in which the extraction is proceeding.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The herein-described continuous process for the treatment of pulp, slimes, tailings, and the like, consisting in moving a thin body of same in a cyanide or like solution having a large surface exposed to the air, and subsequently transferring such material and solution to settling-tanks, substantially as and for the purpose described.

2. The herein-described process for the continuous treatment of pulp, slimes, tailings, and the like with cyanide and similar solutions, consisting in subjecting a comparatively thin body or mass of same in the solution to the action of moving rakes or like apparatus, and subsequently allowing the mass of tailings or the like to separate from the solution in settling-tanks, substantially as and for the purpose described.

3. The herein-described process for the continuous treatment of tailings and the like with cyanide and similar solutions, consisting in subjecting a comparatively thin body of same to a raking or stirring action in water with or without quicksilver, lime, or other desired additions, and then treating such thin body in a series of baths, and in a continuously supplied cyanide or like solution, to the action of rakes or stirrers, and subsequently allowing the mass to separate from the solution in one or more settling-tanks, substantially as described.

4. The combination with a series of shallow tray-like baths, having suitably operated rakes or the like therein, of settling-tanks provided with means for the removal of the solid and liquid contents separately, substantially as and for the purposes described.

5. The combination with a series of settling-tanks having means for discharging the solid and liquid contents of conveyors adapted to transfer the solid contents of one or one series into the next tank or series, substantially as and for the purposes described.

6. The arrangement of apparatus substantially as and for the purpose described and illustrated in the accompanying drawings.

Dated this 4th day of August, 1897.

JOHN POOLE.

#### A RESPIRATOR FOR USE IN DRY-CRUSHING AND SIMILAR DUSTY OPERATIONS.

I, Holroyd Fitz-William Way, of Hauraki, Thames, in the Provincial District of Auckland, miner, do hereby declare the nature of my invention for "A Respirator for Use in Dry-crushing and similar Dusty Operations," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My respirator for use in dry-crushing and similar dusty operations is an apparatus consisting of a watertight vessel made of gutta-percha or metal with a capacity of about a quarter of a pint, and shaped outside like a watch, but the outside shape is immaterial. The watertight vessel is attached to the chest of the workman by a hook or pocket in the shirt, and is connected to the nose and mouth by a flexible tube of rubber with one end funnel-shaped, and lined with chenille or some fluffy material, to fit over the nose and mouth. The watertight vessel is about two-thirds full of water, and may be readily filled and emptied from time to time. On the accompanying drawing at Fig. 1 is an outside view of the watertight vessel. At letter A is an interior division shown by dotted lines, which separates the watertight vessel into two compartments, with the exception of a small space at the bottom marked letter B. The water is shown by horizontal dotted lines. At letter C is a funnel-shaped opening for admitting the dusty air. At letter D is a nozzle upon which is fitted the flexible tube, marked letter E. To fill the watertight vessel it is only necessary to pull it off from the flexible tube E and dip it into a bucket of water. To empty the watertight vessel when the water has become impure from dusty particles it is only necessary to pull it off from the flexible tube E and turn it upside down and shake the water out. The dusty air that is breathed through the watertight vessel is filtered by the water in manner similar to a Turkish hubble-bubble tobacco-pipe. The funnel-shaped end of the flexible tube is kept in position over the nose and mouth by a string or elastic passing round the head of the workman.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is: The watertight vessel with the interior division, the funnel-shaped opening, the nozzle, and the flexible tube, substantially as shown and described.

Dated this 27th day of August, 1897.

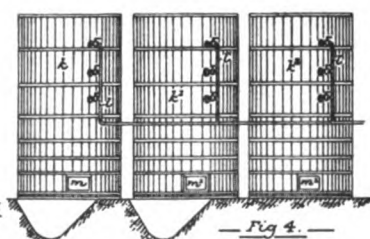
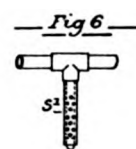
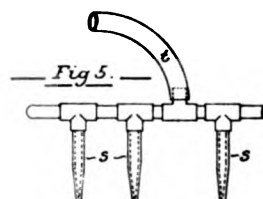
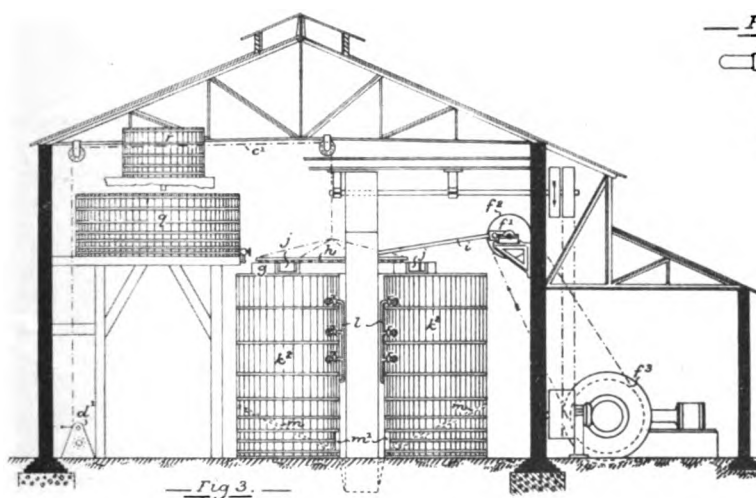
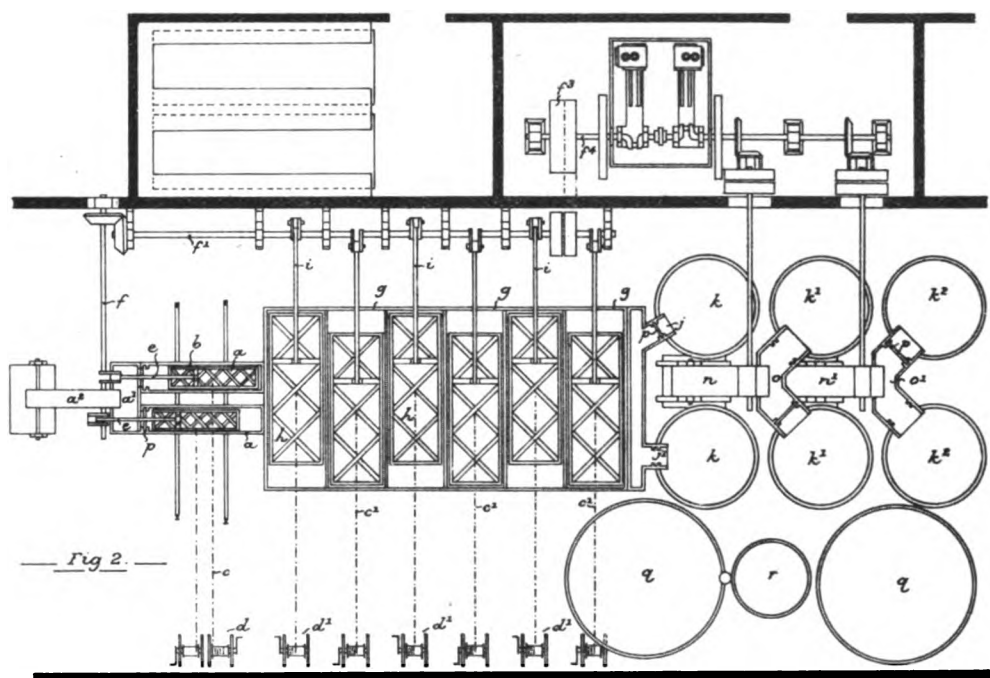
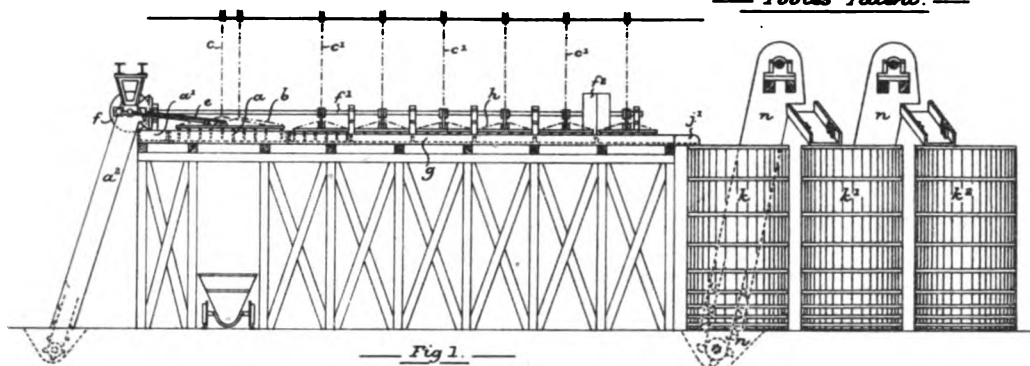
H. F. WAY.

#### AN IMPROVED COMBINED FURNACE AND PRECIPITATING APPARATUS FOR RECOVERING GOLD FROM CHARCOAL OR SIMILAR SUBSTANCES.

I, James Turnbull, of 72, King William Street, Fitzroy, in the Colony of Victoria, engineer, do hereby declare the nature of my invention for "An Improved Combined Furnace and Precipitating Apparatus for recovering Gold from Charcoal or similar Substances," and in what manner the

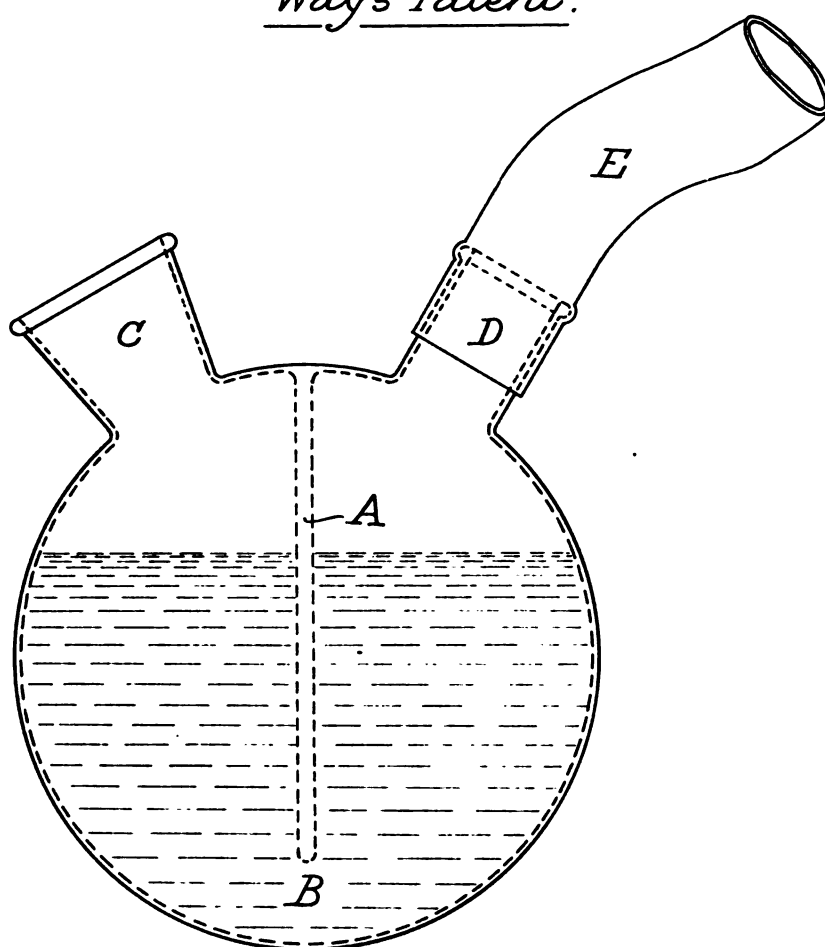
# IMPROVED APPARATUS FOR TREATMENT — OF ORES, TAILINGS &c. —

Pool's Patent.





RESPIRATOR  
for  
use in dry crushing  
Way's Patent.



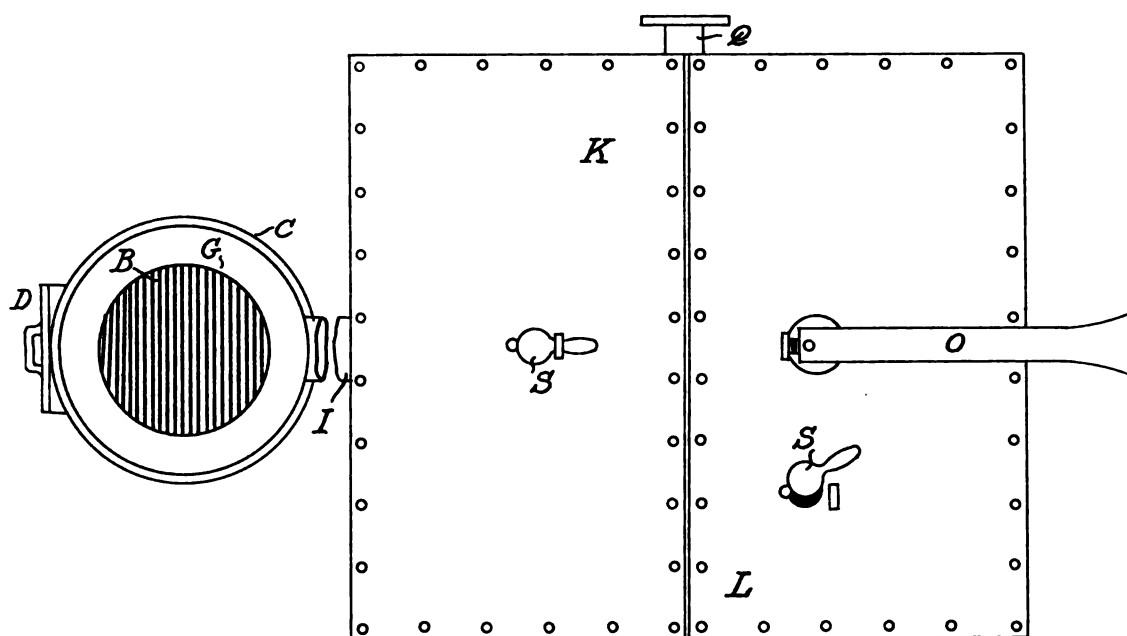
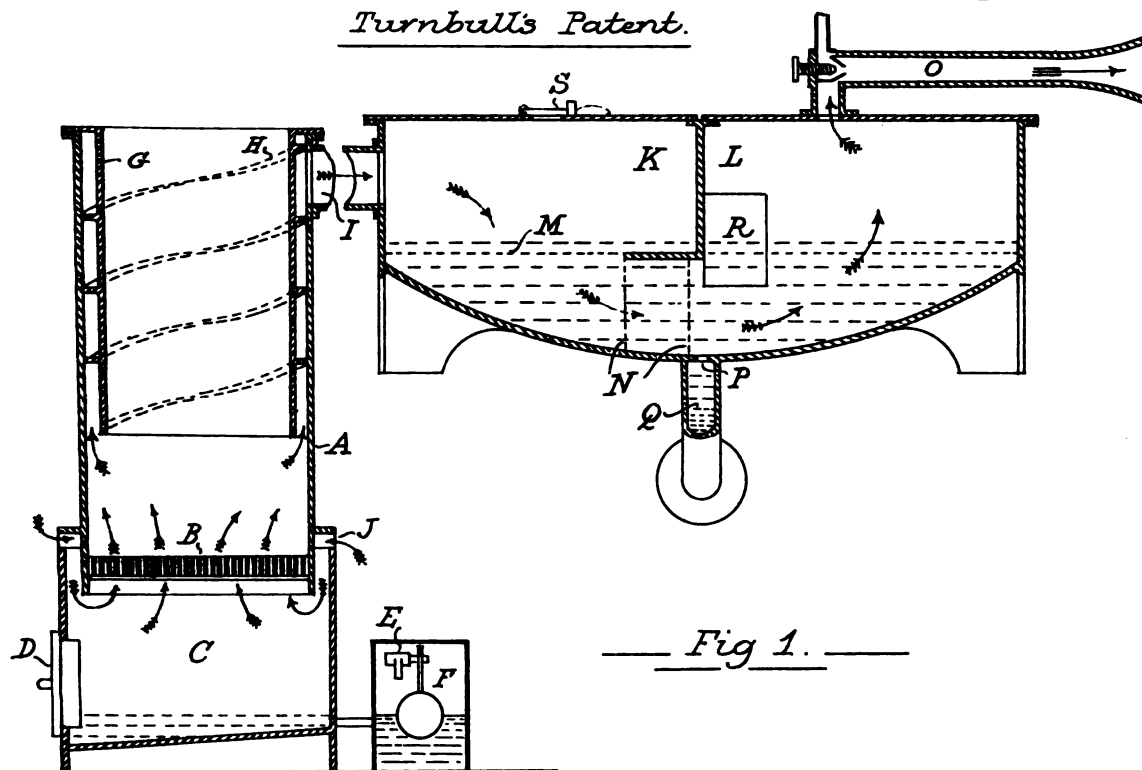
9968.

— Fig 1. —



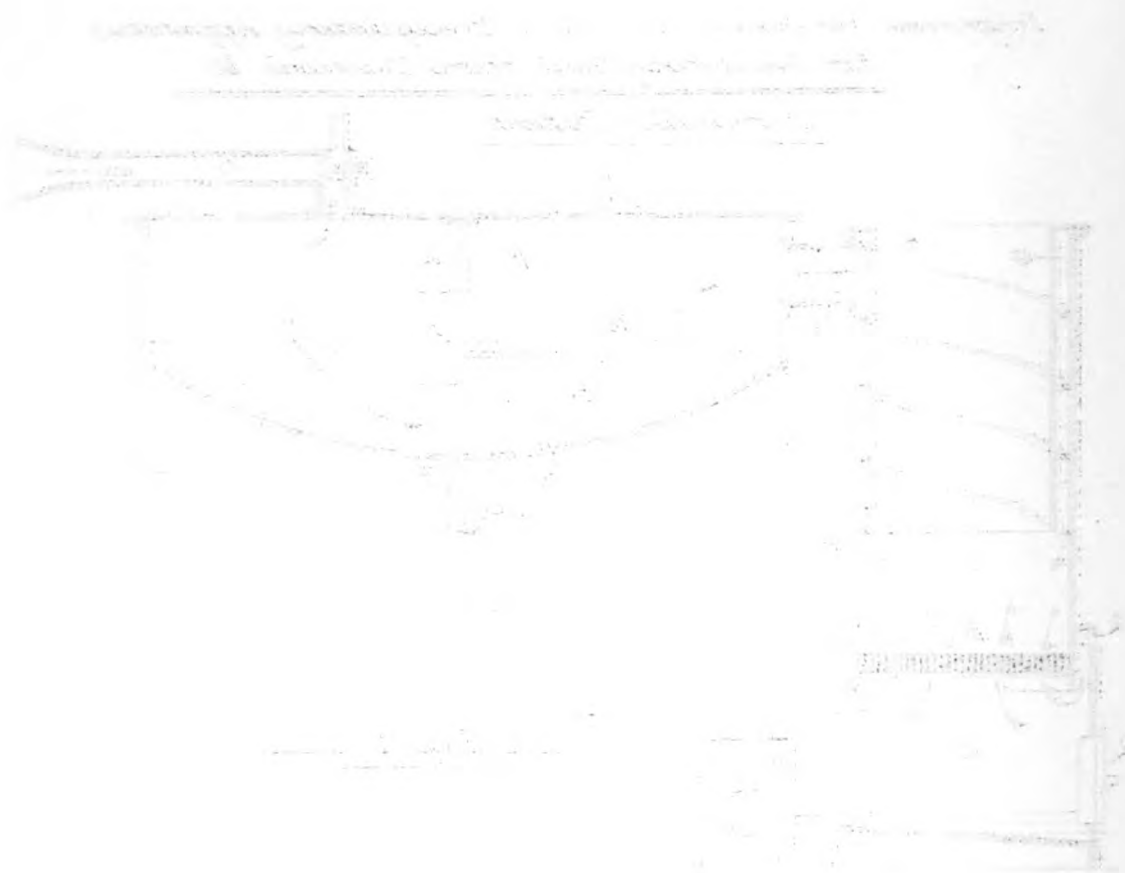
*Improved Combined Furnace & Precipitating Apparatus  
for Recovering Gold from Charcoal &c.*

Turnbull's Patent.



10095.





same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of my invention is to provide a cheap and effective apparatus for recovering gold which has been precipitated from its solution upon charcoal or similar substances. The processes that have hitherto been employed have been both slow and wasteful, and, owing to the minuteness of the gold particles to be recovered, unavoidable losses of that metal have always arisen. But with my improved furnace and apparatus a much quicker destruction or burning of the charcoal is admitted, whilst it has the distinct advantage of recovering the whole of the gold.

My invention consists of a circular or other shaped outer shell situated over a series of furnace-bars. Inside the outer shell is an inner one, into the top of which the auriferous material to be treated is placed. The fire already kindled causes fumes to be liberated from the charcoal, which fumes are drawn into the space (annular or otherwise) which exists between the inner and outer shell. From the top of this space they are drawn into a precipitating-box, in which they are robbed of all the particles that may be held in suspension.

But in order that my invention may be better understood I will now refer to the accompanying sheet of drawings, which are to be taken as part of this specification, and read herewith.

Fig. 1 represents a sectional elevation of my invention, the arrows showing the course of the ingoing air and of the outgoing fumes generated. Fig. 2 represents a plan of the same. Similar letters of reference indicate similar or corresponding parts where they occur in the several views. On reference to the drawings it will be seen that A is the outer shell, near the bottom of which are the furnace-bars B. These latter are placed at the top of the lower chamber C, and may be removed or replaced either from the top of the outer shell or from a door in the side of the same. This lower chamber or ash-pit is provided with a draw-off or drain-tap and a door D, through which door, after or before the water is drawn off, all auriferous accumulations or sludges are removed. The chamber C is partially filled with water, the height of which is regulated preferably by a ball-operated tap E, situated within an auxiliary water-chamber F. Resting upon the top of A, or secured in any other way, is the inner shell G. This, which is open at both ends, may be either taper or parallel or longer or shorter than shown. As will be seen, the bottom end does not reach the fire-bars, but stands some distance above them. Into the top of G, which is generally uncovered, the auriferous material is fed wet, as it comes from the fillers, when it falls upon the fire-bars upon which a fire has been previously kindled. The charcoal is fed into G until it is flush with the top of the same, and as it is consumed the supply is replenished. Air is admitted beneath the furnace-bars by the air-inlet holes J, situated in the ash-pit portion, the area of which holes may be adjusted in any well-known way.

The gases or fumes arising from combustion, instead of passing upwards and outwards through the top of G, are drawn into the covered space between A and G, which may be provided with a spiral circulating web or webs H. At the top of A is a pipe I leading the fumes into the inlet end of a precipitating-box K containing water.

This box is divided above the water-line into an inlet and an outlet end by a bulkhead or baffle-plate L, which descends from the top and is partially immersed in the water. The height of this bulkhead, which may be of any shape or shapes, is regulated in any well-known way, either from the interior or the exterior of the box. Beneath the surface of the water and at any predetermined height, and extending from one end of the box to the other, is a gauze or grating M. Beneath L one or more similar gratings N extend to the bottom of the box. Above the water on the outlet end is a discharge-pipe O, on which is an ejector operated by water, exhaust or other steam, compressed air, or a fan; or a natural draught may be induced by a chimney.

At the bottom of the precipitating-box, which, to assist the wash of the water, is preferably made with a concave bottom as shown, is a longitudinal or other slot P. In this the auriferous or other deposits gradually fall and gather in a receiver Q, from which they can be removed for treatment by a sluice valve, cock, or other means without arresting the progress of operations. In the side of the tank and in any convenient position may be situated an observation-window R. There may also be a gauge-glass if necessary; and on the top of the box, and attached to the removable covers thereon, one or more water-inlet or flushing cocks S. To the said box may be connected, as to the ash-pit chamber, an auxiliary water-chamber, whereby the water in the box may be maintained at a uniform level.

The cycle of operations is as follows: A fire having been kindled on the bars and the ash-pit being partially fitted with water, the auriferous material is charged into the inner shell. The air, entering the air-inlet holes, passes with the water-vapour generated from the water in the ash-pit through the fire-bars.

As the air and vapour emerge from above the fire they enter the space between the two shells, and pass out of the same by the pipe leading to the inlet end of the precipitating-box. The fume-laden air then enters the water with which the latter has been first charged, and, passing through the horizontal and vertical gratings, has thereby arrested all the particles that it was carrying away in suspension. These are precipitated in the form of a deposit or sludge in the bottom of the box, and are removed from the receiver and treated as required.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The improved furnace for recovering gold from charcoal or similar substances, consisting of the combination of an outer shell as A, with an inner shell as G, both of which are situated above a series of fire-bars, all as and for the purposes hereinbefore described and as illustrated in the drawings.

2. The improved furnace for recovering gold from charcoal or similar substances, consisting of the combination of an outer shell as A, having air-inlet holes on its bottom, an inner shell as G, having a spiral web as H around its circumference, both shells being above fire-bars as B, a closed

ash-pit as C having a door as D, and self-regulating water-supply, all as and for the purposes hereinbefore described and as illustrated in the drawings.

3. In an improved furnace for recovering gold from charcoal or similar substances a water-charged ash-pit, above which are furnace-bars, and an inner and an outer shell, all as and for the purposes hereinbefore described and as illustrated in the drawings.

4. An improved precipitating apparatus for recovering gold from charcoal or similar substances, and in combination a precipitating-box containing water, through which the fumes pass, and in which descends a bulkhead and a grating or gratings, and across which and beneath the water is a similar grating, all as and for the purposes hereinbefore described and as illustrated in the drawings.

5. An improved precipitating apparatus for recovering gold from charcoal or similar substances, and in combination a precipitating-box as K, having therein a bulkhead as L, and a grating or gratings, a slot as P, and receiver as Q, a window as R, flushing-cocks as S, and a discharge-pipe as O, all as and for the purposes hereinbefore described and as illustrated in the drawings.

6. In an improved furnace and precipitating apparatus for recovering gold from charcoal or similar substances, and in combination an outer shell as A, an inner shell as G, between which is a web as H, fire-bars as B, a closed ash-pit as C, the water in which is maintained at a constant height, a precipitating-box as K, having therein a bulkhead and gratings and a receiver beneath the same, and water maintained at a uniform height, all as and for the purposes hereinbefore described and as illustrated in the drawings.

7. The whole of the combination and arrangement of parts as hereinbefore described and as illustrated in Figs. 1 and 2 of the accompanying drawings, and constituting an improved combined furnace and precipitating apparatus for recovering gold from charcoal or similar substances.

W. E. HUGHES,

Agent for the Applicant.

Dated this 4th day of November, 1897.

#### IMPROVEMENTS IN EXTRACTING PRECIOUS METALS FROM MINERALS CONTAINING THEM, AND APPARATUS THEREFOR.

I, Beda Becker, of Hufengasse, 13, Eupen, in the German Empire, civil engineer, do hereby declare the nature of my invention for "Improvements in extracting Precious Metals from Minerals containing them, and Apparatus therefor," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to the treatment of minerals containing precious metals, for the extraction of these metals, and to apparatus for that purpose, which I shall describe, referring to the accompanying drawings: Fig. 1 is a sectional elevation of a dissolving-vat according to my invention, with means of circulating its contents. Fig. 2 is a plan to an enlarged scale of a nozzle that may be applied to the bottom of the vat. Fig. 3 is a sectional elevation of an electrolytic vat employed in conjunction with the dissolving-vat. Fig. 4 is a plan on the line 4-4 of Fig. 3, showing some of the electrodes. Fig. 5 is a similar view showing a modification.

Similar letters of reference indicate corresponding parts in the several figures. *a* is the dissolving-vat, preferably of conical form. *b* are amalgamating-plates, which in some cases are removably attached to the side of the vat, preferably in separate sections. *c* is a rotary pump, having suction-pipe *d* leading from the upper part of the contents of the vat, and having suspended from it a shield *d'* having its edge just below the surface of the liquid, so that the liquid has to flow over the sides, and thus only the clearest of the solution is drawn off by the pump through the pipe *d*. *e* is the discharge-pipe leading to the nozzle *f*, which has a passage or passages so arranged as to discharge the entering fluid towards the sides of the vat, these passages being preferably helical, so as to give rotary motion to the material passing through it. *j* is a valve by opening which the contents of the vat, or a portion of them, can be discharged or delivered into a recipient *i*. In operating with this apparatus alone the vat is filled above the mouth of the pipe *d* with solution of a suitable solvent, such as potassium-cyanide, and the pump *c* is put in motion so as to cause active circulation from the upper part of the solution down the pipe *d*, then along the pipe *e* through the nozzle *f*, and up through the vat, preferably with the whirling motion due to the helical passages in *f*. The crushed mineral to be treated is introduced into the circulating liquid, by which the precious metal or a portion thereof is dissolved. When the amalgamating-plates *b* are employed portions of the metal are deposited in amalgam on the plates, which are from time to time removed, fresh plates being substituted for them. After a time the speed of the pump, and consequently of the circulation of the fluid, is lessened, so that the heavier particles suspended in the fluid, along with such portions of amalgam as may be detached from the plates, subside to the lower part of the vat, and are by opening the valve *j* discharged into the removable recipient *i*. The heavier particles and amalgam may be thus repeatedly removed, and the remaining contents of the vat can be run off, to be treated by electrolysis or in any known manner for the recovery of the metal which it contains. I prefer, however, to apply electrolytic treatment to the contents of the vat, it may be while the solution is proceeding, and for this purpose I employ the arrangement of the electrolytic vat along with the dissolving-vat for recovering the precious metals. In this apparatus *k* is the electrolytic vat, which is connected at the bottom by a pipe *l* with valve *y* and at the top by a pipe *m* with valve *w* to the pump suction-pipe *d*. The pipe at the top of the electrolytic vat is adapted to be readily removed so as to give access to the vat. It rests on supports *u u*, and communicates through a plug *p* with perforated branch-pipes *o*, which are caused to rotate by a band on a pulley *c* or otherwise, so as to distribute liquid from the vat *a*.

From a frame *s*, supported on brackets *t t*, depend a number of anode plates *r*, and from insulated frames *v* depend cathode plates *u*, which alternate with the anode plates, and can be lifted out from between them when required. The anodes and cathodes may be curved and concentric as shown in Fig. 5, or may be straight and radial as shown in Fig. 4.

While solution is going on for a time in the vat *a* the electrolytic vat *k* is disconnected from it by closing the valves *w* and *y*, but when the solution has for some time gone on in *a* the valves *w* and *y* are opened, and a valve *x* in the pipe *d* is closed. The fluid carrying the mineral matter is thus caused to circulate not only through *a*, but also through *k* from the distributing-pipes *o* downward past the electrodes to the suction of the pump, and thence as before through *a*, and so on. When the vat *k* is of metal its interior should be enamelled or otherwise coated to prevent electrochemical action on it.

Instead of employing electrolysis as above described, for which a current of electricity is necessary, the metal may be deposited from the solution upon zinc shavings, in the known manner. When this method of depositing is adopted it is only necessary to remove the electrodes from the electrolytic vat and charge it with zinc shavings; all the connections to the dissolving-vat remain unchanged.

Instead of employing a single dissolving-vat several of these may be arranged to operate in succession with one electrolytic vat or several of these. Each of the dissolving-vats may deliver to the next in order solution with a less quantity of solid matter and the liquid from the last of these vats, whence after deposit of the precious metal the liquid may be returned to the first of the dissolving-vats.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In apparatus for extracting precious metals from minerals containing them the combination of a dissolving-vat with a circulating pump, or its equivalent, with suction- and discharge-pipes and a valved discharge, substantially as and for the purpose set forth.

2. In combination with the dissolving-vat above referred to amalgamating-plates attached to its sloping sides, substantially as described.

3. In combination with a dissolving-vat such as is above referred to a nozzle to the discharge-pipe having helical passages, substantially as and for the purpose set forth.

4. In combination with the dissolving-vat above referred to an electrolytic vat with connecting pipes and valves and with electrodes arranged therein, substantially as described.

5. The herein-described method of treating minerals containing precious metals for extraction of the metals therefrom by causing the crushed mineral mixed with solvent solution to circulate or pass through a dissolving-vat or several of these which may contain amalgamating-plates, and also through an electrolytic vat, or other depositing-vat.

Dated this 22nd day of October, 1897.

BEDA BECKER.

#### IMPROVED APPARATUS FOR SAVING FINE GOLD.

I, George Henry Oatway, 31, Moray Place, Dunedin, New Zealand, merchant, do hereby declare my invention for "Improved Apparatus for saving Fine Gold," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of this invention is to produce an apparatus that will arrest any fine gold that passes through it, and it consists of a combination in any description of enclosed box, chamber, or flue of straight, fluted, or curved metal plates having plain, chequered, or roughened prepared gold-saving surfaces (the sides of the box will usually be lined in a similar manner, and where required may be used so lined and without plates) in either case for the purpose of reclaiming the light or float gold which sometimes escapes to the dump in the tailings or tail-water of a dredge, hydraulic elevator, or ground-sluice.

These plates or lining are preferably placed at an inclined plane to the current, and far enough apart to discount choking, whilst (when using the plates) dividing the auriferous wash- and tail-water to be dealt with into as many separate streams or slices as may be expedient.

The passage through between the plates is either a parallel one without break or angle, or taper, preferably narrowing towards the lower or outlet end, and generally widening the other way, so that the same area is maintained throughout.

Where curved or fluted plates are used the same method would be adopted; the streams being compressed one way and forced out laterally into a fan shape tend to facilitate contact of the gold and the saving surfaces of the plates or sides of the box.

The auriferous material and water may thus be passed through in one stream or film, or may be split up into a number of streams or films, and in its passage through the apparatus it is confined between surfaces, whether parallel or converging, fluted, straight, or curved.

A fixed, vibratory, or revolving screen, sieve, or grating, or a series of any screens, sieves, or gratings, for attachment to or for use in conjunction with the tailings-chute, or sluice-boxes, or races of a hydraulic elevator or ground-sluice, for the purpose of restraining or preventing the coarser pieces of quartz or stones travelling with the auriferous wash and water from passing through to the prepared gold-saving plates and scouring or rubbing off the amalgam or other preparation or material, or choking. This screen or series of screens may be fixed in the sides of the races to allow the fine wash to pass to the plates on either side or horizontally, vertically, or at any incline to the current, or in any other way, for the purpose indicated.

Also the same fixed, vibratory, or revolving screen, or series of screens, sieves, or gratings, for attachment to and for use in conjunction with the tables, sluices, or other gold-saving appliances of a dredge for the purpose of receiving the auriferous wash and water at any time after its delivery from the principal revolving screen, or from the buckets or suction-pipe if no screen is used, and restraining or preventing the coarser particles travelling with such washdirt from passing between

the gold-saving plates and scouring or rubbing off the amalgam or other gold-saving preparation or material, or choking, blocking, or damaging the plates.

In combination with the screen last described of a fixed or pivoted comb or series of combs or weights, used either together or separately, of any suitable substance, but preferably of silvered copper, which may be used at any angle in the tail-race, sluice-box, or on the tables for the purpose of reducing or breaking the velocity of the wash and allowing it to settle through the screen to the gold-saving plates.

These combs or brushes may be suspended above the current in such a way that its velocity is checked by their weight, or may be fixed either above or below in such a manner that their members or long fingers may partly obstruct the flow for the purpose described.

Referring to the accompanying drawing, Fig. 1 is a diagram of a number of boxes arranged in different ways and at different angles for treating gold-saving wash. For convenience these boxes are shown as arranged under a race the bottom of which is perforated or has bars where the boxes are attached, though obviously the boxes may receive the wash in any manner so that the wash passes through it or them. Fig. 2 is a cross-section of one of the boxes, showing the spreading or fan-shaped widening to counteract the narrowing sideways and maintain the same area throughout, or approximately so. A is a taper box shown containing straight converging plates marked *a*. B is a parallel box shown with parallel straight plates, but corrugated or fluted plates could be used in it; the straight plates are marked *b*, and plan of fluted plates *A*<sup>1</sup>. C and the plates *c* are similar arrangements placed at an angle. D is a box similar to B or C, with plates broken as to their continuity. E and plates *e* are similar to A and *a*, but curved. It is obvious that the shapes are capable of large variety for the same purpose. When parallel boxes are adopted they would generally be parallel in the cross section, not as in Fig. 2, or fan-shaped. F shows one place where screening may be used—namely, at the inlet to the boxes.

To prevent the rush of the wash over the screen-plates combs would be placed so as to arrest and turn the body of wash, and cause a swirl in the box, or weights, preferably balls, would be suspended from a convenient place. These are marked G and H respectively, and any suitable partial obstruction would be used, and in cases the obstruction would be of a gold-saving character.

Any suitable materials or sizes may be adopted in this invention, and any description of surface for catching, arresting, or saving gold mechanically or chemically.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In an apparatus for saving gold consisting of a box, chamber, or flume (such as A, B, C, D, E) lined with gold-saving plates or material, and with or without intermediate plates (such as *A*<sup>1</sup>, *a*, *b*, *c*, *d*, *e*) for splitting up the stream of auriferous wash that passes through the apparatus, the combination of such box, and the lining or plates, with any description of screen or screens (such as F) and current deflectors (such as G, H), substantially as described and explained, and as illustrated in the accompanying drawing.

2. In an apparatus for saving gold the combination of special taper one way and fan-shaped the cross way, for forming boxes for passing through the auriferous wash so as to get substantially the same area throughout the box or divisions, with screening apparatus (such as F) and deflectors for breaking a straight or rushing current when required (such as G, H), substantially as described and explained, and as illustrated in the accompanying drawing.

Dated this 9th day of December, 1897.

GEO. H. OATWAY.

#### AN IMPROVED METHOD AND APPARATUS FOR TREATING REFRACTORY ORES CONTAINING GOLD, SILVER, NICKEL, AND THE LIKE.

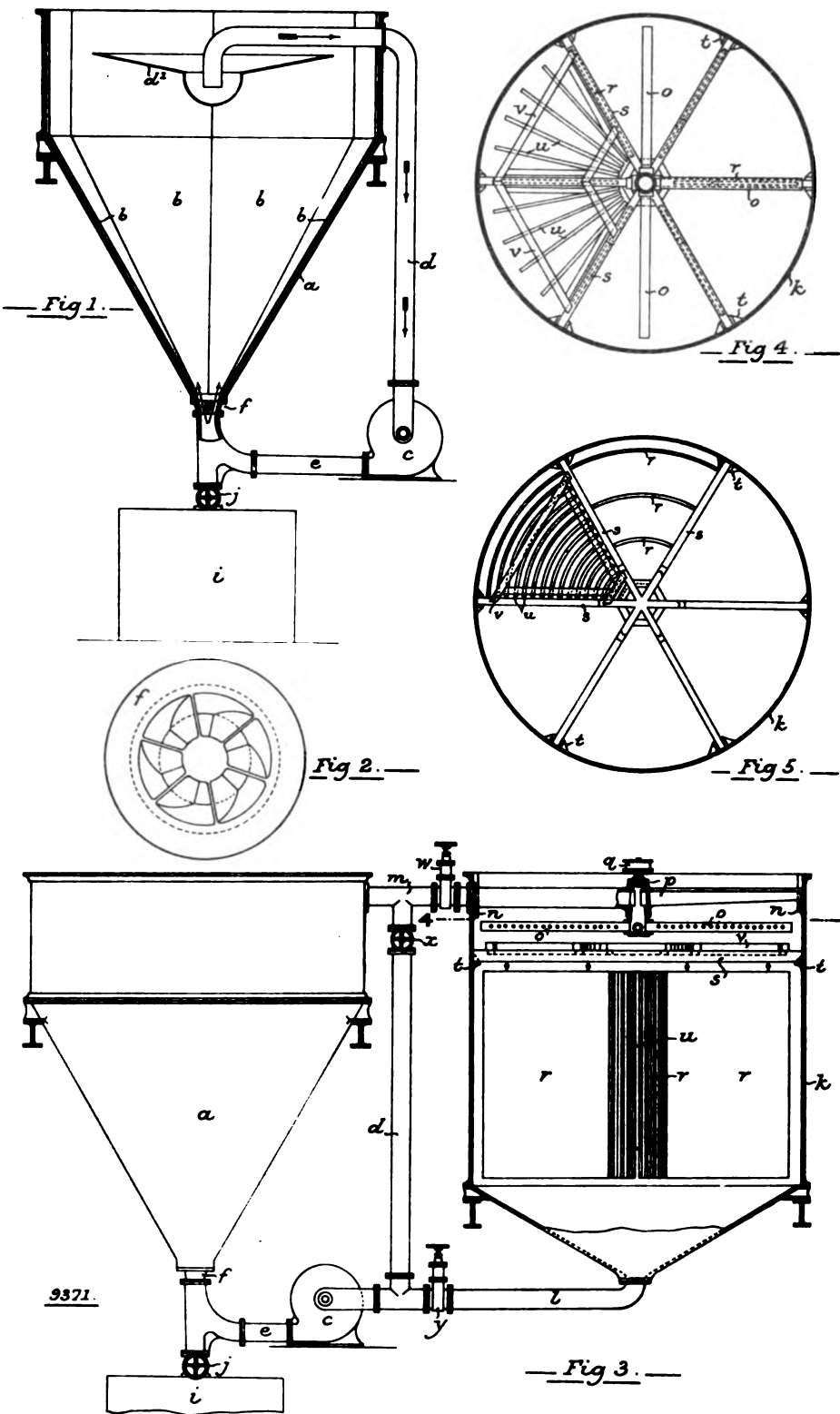
I, John Edward Preston, of 8, Burton Road, Brixton, London, S.W., England, engineer, do hereby declare the nature of my invention for "An improved Method and Apparatus for treating Refractory Ores containing Gold, Silver, Nickel, and the like," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to a specially constructed furnace or apparatus for the treatment of refractory ores, for the purpose of extracting or separating therefrom such precious or other metal or metals as they may contain, the object of my said invention being to provide an apparatus and system that may attain the ends stated more rapidly, effectively, and at less cost than has been possible by the methods and means hitherto employed for the same purpose.

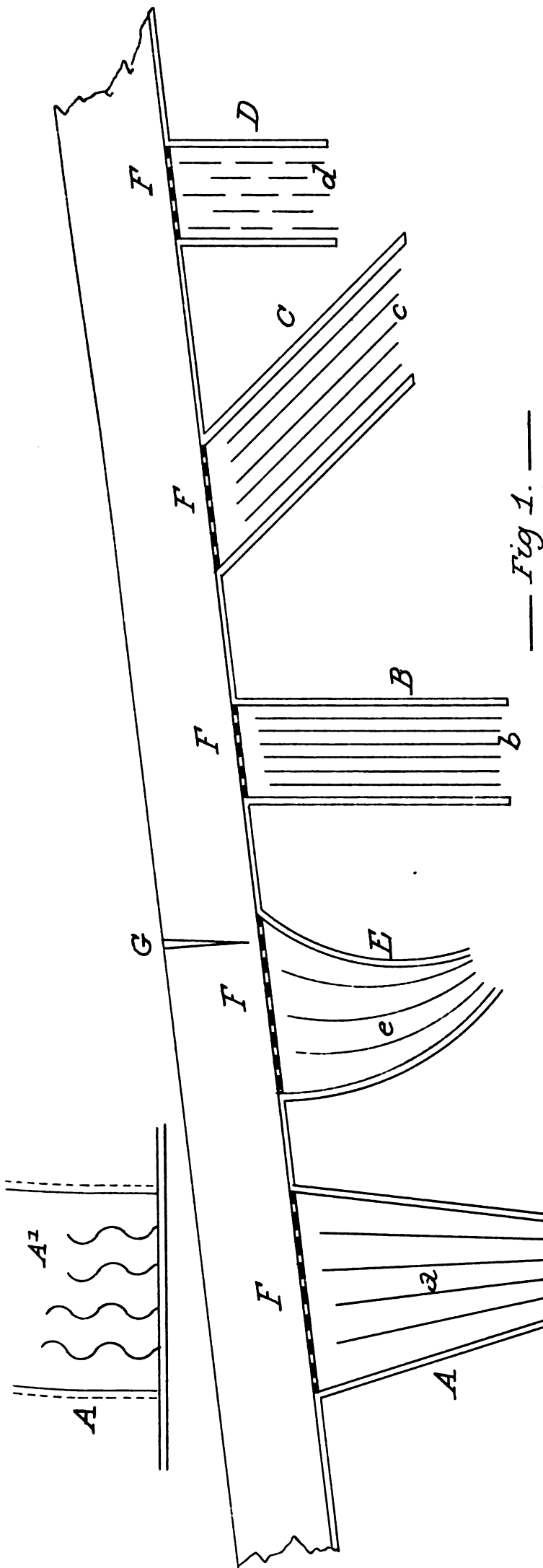
My invention consists of a suitably shaped furnace built of firebricks or other fire-resisting material, or an outer casing of iron lined with fire-bricks or other suitable material, and so constructed and arranged that the base or bottom is provided with a central opening surrounded by a fixed or integral conical perforated chamber extending upwardly into the said furnace, the finely pulverised ore being fed by the force of a blast from a suitable blower through conduits terminating in a nozzle fixed within the said chamber, from which the said pulverised ore is caused to exude with great force out of the top of the said chamber, and to impinge against the under-surface of a block or diaphragm of fireclay or other suitable substance, fixed in such a position within the furnace as to become incandescent by the heat, and by impinging against this the said pulverised ore would become atomized, and the metallic portions be deflected thereby in a downward direction into the body of the furnace, suitable exhausts being provided through which the recovered metal may be led or drained from the furnace, while the fumes and dust would be conveyed by convection in an upward direction through suitable apertures in the said diaphragms into the atmosphere or caused to traverse a conduit leading past a water-curtain or and into a suitable condenser, when such fumes or dust may be impregnated with such volatile metallic particles as may be worthy of recovery.

# IMPROVED APPARATUS FOR EXTRACTION OF PRECIOUS METALS FROM THEIR ORES.

Becker's Patent.

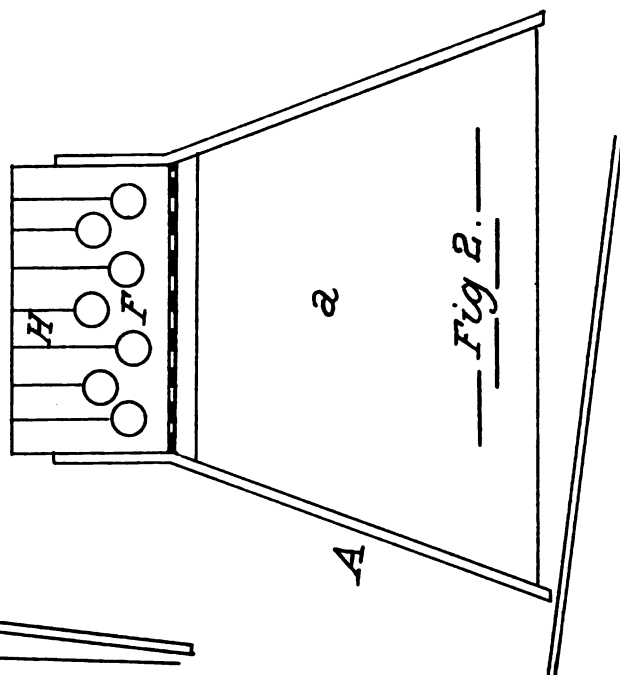






— Fig 1. —

*Improved Apparatus  
for  
saving fine gold.  
Oatway's Patent.*



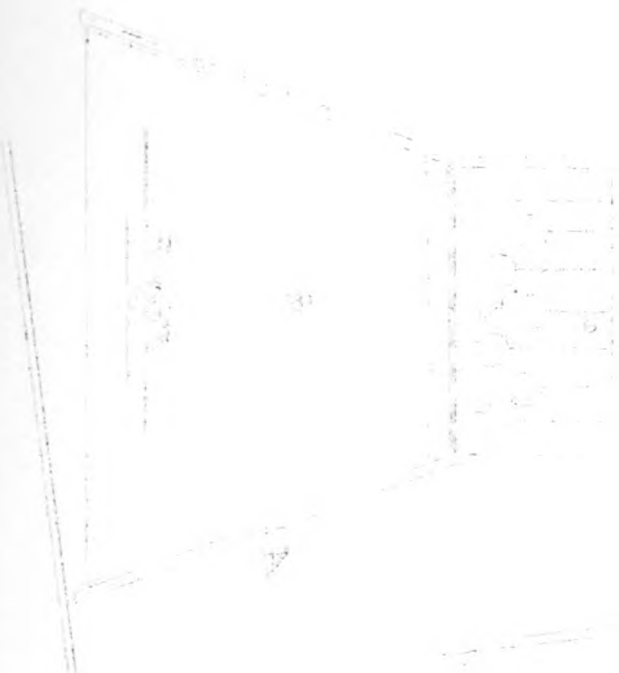
— Fig 2. —

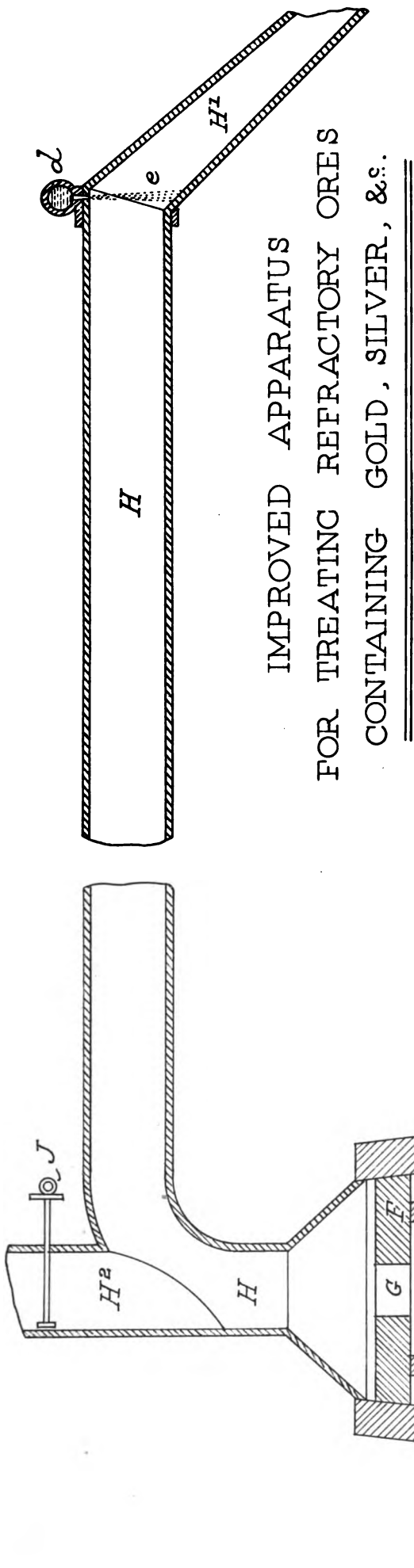
10209.



Handwritten text, possibly a title or header, located in the upper left quadrant of the page. The text is faint and appears to be written in a cursive or script style.

Handwritten text, possibly a title or header, located in the upper center of the page. The text is faint and appears to be written in a cursive or script style.





IMPROVED APPARATUS  
FOR TREATING REFRACTORY ORES  
CONTAINING GOLD, SILVER, &c.

*Preston's Patent.*



In order that my improved system and apparatus and the manner, or substantially so, in which I purpose constructing the latter may be fully understood, reference is hereinafter made to the accompanying drawings, in which the furnace and certain of its conduits are shown in section.

In carrying my invention into effect I prefer to construct the furnace proper A of circular formation in plan, and slightly coned or tapered from the bottom to the top, and I may provide the said furnace wholly of firebricks or other suitable material, or with an outer casing of iron lined with firebricks or other material, but preferably the former; and in any convenient part of the said furnace I may provide an opening and door, or openings and doors (not shown), through which the fuel may be fed, when solid fuel is used, but when petroleum or other liquid fuel is employed this may be fed into the furnace by other means hereinafter explained. By preference the said furnace would rest upon any number of suitable blocks B, and between and within these the bottom of A would be provided with a central aperture C, surrounded by a conical or tapered chamber D, standing up within the furnace, and provided with any number of perforations or holes E, inclined in an upward direction from the outer to the inner surface. The said chamber may conveniently be of the same material as A, when the latter is constructed without a metallic casing, and may be either fixed in position by any suitable means or formed integrally with A, preferably the latter, as shown. The upper end of a furnace is closed by a fireclay or other diaphragm F, having a central opening G, and upon the said diaphragm rests the funnel-shaped mouth of a fume and dust conduit or exhaust H, which may bend and extend in any direction, its final end H<sup>1</sup> leading to a suitable condenser (not shown), and in a direct line above the opening G in F the said conduit H is provided with a branch H<sup>2</sup> leading to the atmosphere, in which a suitable damper J is provided, by means of which the said branch may be opened or closed at will.

In any suitable position adjacent to the furnace and convenient for operation by any available power I provide a suitable blower K, the air-current from which is conveyed by a pipe L to surround or partly surround the furnace A, and at suitable intervals in this I provide any number of depending branches M, each connected to a suitable fireclay or other nozzle or tuyere N leading through apertures in the wall of A into the fire-space O, and, by means of the said conduit and nozzles, the whole or part of the said blast may be employed, when needed, for imparting extra draught to the furnace, suitable throttle or other valves being provided in any part of the conduit L, when necessary, for opening and closing this at will. The conduit L is provided with a branch-pipe P, which terminates in a nozzle R within the chamber D, and at any convenient part of the said branch-pipe P a suitable adjustable hopper T is provided, which receives the finely pulverised ore to be treated, and anywhere between the said hopper and the conduit L the said pipe P is provided with a screw-down or other suitable valve, such as S, by means of which the passage through P may be wholly or partly closed or opened at will, to regulate the force of the blast.

The manner of operation is as follows: Given that the fire in the furnace has been lighted and in a condition for work, the air-blast through L may be wholly or partly closed, when the ore, in a finely pulverised condition, would be fed into the hopper T, and the valve S be opened, when the current of air passing through P would convey with it the pulverised ore, which would be thereby forced up through the nozzle R and out at the top of the chamber D, and this forced draught through D would create an up-draught of superheated air through the perforations E in D, thus superheating the powdered ore, which would be caused to impinge upon the point *a* of the under-surface of a coned plate or diaphragm V, suspended beneath the diaphragm F, and now white hot or incandescent from the heat of the furnace; and this being now the hottest part of the furnace, such impact with V would vapourise or atomize the pulverised ore, and deflect this in all directions from the centre of the furnace, when the metallic portions would be melted and fall into the fire at O, and pass out through suitable outlets *b*, while the fumes, dust, and more volatile portions would, by the aid of convection (and, maybe, by assisted draught through the nozzles N), pass upwardly through apertures *c* in V, and through the opening G in F, into the conduit H, and, by opening the damper J, be allowed to pass out through H<sup>2</sup> into the atmosphere, or, by closing the said damper, to pass along the conduit H and H<sup>1</sup> into a suitable condenser, according to the constituents of the fumes; or, as the ore under treatment is known to contain metal of greater or lesser density, and for the purpose of recovering from the said fumes such metallic portions as may be valuable, I may, in lieu of or in addition to the use of a condenser in the usual way, provide a water-curtain at the end of the conduit H (shown by dotted lines at *e*), by the means of a water-conduit *d*, having suitable perforations through which the water may fall.

I may find it convenient to employ petroleum or other liquid fuel in lieu of ordinary fuel, in which case I may employ means by which such liquid fuel may be conveyed into the furnace O by the use of certain of the nozzles or tuyeres N, which, for this purpose, may be perforated at their final ends, so as to emit the said liquid fuel in the form of a spray, suitable valves or taps being provided where necessary to regulate the flow of the said liquid fuel.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The improved method of and apparatus for treating refractory ores, substantially as herein described and shown.

2. In the treatment of refractory ores the combination of a reducing-furnace, and means for conveying the said ores in a finely powdered condition thereinto by the use of a powerful air-blast, substantially as herein described and shown.

3. In the treatment of refractory ores the combination of a furnace A, having diaphragms F and V, and chamber D, with perforations E, with means for conveying a blast of air to the said furnace from a suitable blower, and by means of a conduit such as P, and nozzle R, for utilising the said blast for conveying finely pulverised ore from a hopper such as T to the said furnace, and means such as a conduit H, H<sup>1</sup>, and H<sup>2</sup>, and water-curtain *e*, for exhausting the fumes from the furnace and recovering volatile metallic particles therefrom, substantially as herein set forth and shown.

Dated this 4th day of February, 1898.

J. E. PRESTON.

## IMPROVEMENT IN WET PROCESS FOR EXTRACTING GOLD FROM GOLD-ORES OR ORE WASTE.

I, Arnold Fredrik Lundstrom, of 50, Klarabergsgatan, Stockholm, engineer, do hereby declare the nature of the invention for "Improvement in Wet Process for extracting Gold from Gold-ores or Ore Waste," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The wet processes heretofore used for extracting gold from gold-ore have chiefly been based upon the solubility of the gold in materials which contain or develop free chlorine or bromine, such as nitro-muriatic acid, chloride of lime, and muriatic or sulphuric acid, &c., or in cyanide compounds, as, for instance, cyanide of potassium, &c.

The object of this present invention is to extract the gold by means of solutions which, while containing or developing chlorine or bromine, also contain chlorine or bromine compounds of such metals which with the chlorine or bromine are able to form higher chlorine or bromine compounds, such as superchlorides, which, like a kind of carriers, cause the dissolving action of the chlorine upon the gold. Such suitable metals are, for instance, lead and manganese, but even the higher chlorine compounds of nickel or cobalt, as well as iron, have a favourable influence upon the extracting of the gold.

Solvents of this kind, containing also higher chlorine or bromine compounds, extract the gold more easily than the compounds containing only chlorine or bromine. The gold is thus extracted easier by means of a chloride-of-lime solution acidulated with muriatic or sulphuric acid to which is added lead-chloride,  $PvCl_2$ , which is thereby transformed into a superchloride,  $PvCl_3$ ; the case is analogous with regard to an addition of chloride of manganese,  $MnCl_2$ , which by free chlorine is transformed into superchloride of manganese,  $MnCl_3$ , and so also with the chlorine compounds of other metals which by free chlorine are transformed into higher chlorine compounds.

The aforesaid favourable action of the higher chlorine or bromine compounds is explained thereby that the chlorine or bromine thereby always acts, as it were, in a nascent state, as the higher chlorine or bromine metals easily give off a part of their chlorine or bromine to the gold, which is then extracted in the form of chloride or bromide of gold, whereupon the lower chlorine or bromine compounds thus formed are transformed in higher chlorine or bromine compounds by a new accession of chlorine or bromine.

In order to describe the new process more fully I shall select chloride of lead as an example of a chlorine or bromine metal acting in this manner, and a chloride-of-lime solution acidulated by muriatic or sulphuric acid as an example of a chlorine- or bromine-developing solution. Through treatment of the chloride of lime with water a solution is first obtained, the strength of which is chosen according to the condition of the ore. Thus, for ores that do not contain more than 10 gr. of gold per ton, and not too large amounts of other chlorine-consuming materials, a chloride solution of 1 to 2 per cent. strength will be suitable. With richer ores somewhat stronger solutions should be used. This solution, together with muriatic acid somewhat in surplus relatively to the amount of chloride of lime, and a solution of chloride of lead to about one-tenth of the amount of chloride of lime, or some other lead compound which with the muriatic acid and chloride of lime solution forms chloride of lead, is then put into extracting-vats with the finely ground ore; free chlorine will then evolve, superchloride of lead is formed, and the gold is extracted as chloride. From this chloride the gold is then separated in some known manner, such, for instance, as by reducing agents, electrolysis, &c. Similarly, the process is carried on if other chlorine metals than chloride of lead are used, or other chlorine-developing means than chloride of lime and an acid—such, for instance, as an electrolysed solution of chlorine metal.

The aforesaid extracting process may be adopted for other than water solutions of chlorine or bromine compounds.

When the ores are rich in silver special silver-extracting chemicals, such as chlorinatrium, hyposulphite, &c., are added to the extracting medium.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, I declare what I claim is: The process for extracting gold from gold-ores or ore waste, consisting in leaching same with chlorine- or bromine-containing or chlorine- or bromine-evolving solutions, to which are added before or during the leaching chlorine or bromine compounds of those metals which by free chlorine or bromine can form higher and less constant chlorine or bromine compounds, superchlorides, or superbromides.

ARNOLD FREDRIK LUNDSTROM.

Dated Stockholm, this 31st day of August, 1897.

## IMPROVEMENTS IN THE TREATMENT OF MINERALS FOR SMELTING AND OTHER PURPOSES.

I, Robert Fergusson Strong, of Victoria Street, London, England, inventor and civil engineer, do hereby declare the nature of my invention for "Improvements in the Treatment of Minerals for Smelting and other Purposes" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Many attempts have been made to utilise minerals of various descriptions which, owing to their granular or friable condition, are not in a fit state for ordinary use. Some of these are mixed with clay or other materials, pressed into blocks, and dried or burned in kilns before using in the reducing-furnace. This is a slow and costly operation, besides adding to the bulk a useless mass, and requiring extra fuel in smelting. Others, again, have used coal-tar and pitch to bind the minerals, and found this mixture would not stand the heat in the smelting-furnace, so that the blocks quickly decrepitated and endangered the proper working of the furnaces by blocking the outlets, and in the case of coal and other minerals of a like nature intended for block fuel the addition of coal-tar and pitch largely increased the smoke, formed clinkers in the fire-boxes, and furred and clogged the tubes of locomotive and other boilers.

My invention is simple. Moreover, the principal binding ingredient—pyroligneous acid—possesses great caloric power, and considerably reduces the quantity of ordinary fuel required in smelting the ores; the ordinary fuel may be altogether dispensed with, and the pyroligneous acid added to coal as a fuel so improves the caloric or burning quality that inferior or waste small coal by this process becomes equal to large, and burns with a clear, bright, smokeless flame.

The pyroligneous acid is the tarry liquid obtained from the dry distillation of waste wood and other ligneous substances, and is easily manufactured at low cost.

In carrying the invention into practice I grind or granulate the minerals, adding fresh calcined alkaline earth (preferably lime) and pyroligneous acid. These are mixed and ground together, or ground separately and mixed, and at once pressed in blocks, which are fit for immediate use.

If it is simply desired to bind the minerals for the reducing-furnace I add about 5 per cent. of lime and about 10 per cent. of tarry pyroligneous acid (all by weight); but if in addition it is desired that the ingredient should act as fuel the pyroligneous acid may be increased to 20 or 30 per cent.

In the case of coal, or other minerals of a like description which is intended for steam or household fuel, I only add 1 or 2 per cent. of lime and from 10 to 15 per cent. of the pyroligneous acid.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The treatment of minerals for the production of metals by adding to them a dry caustic alkaline earth, such as lime, and pyroligneous acid, and grinding or mixing all together, substantially as and for the purposes described.

2. The treatment of minerals for the production of metals by adding to them a dry caustic alkaline earth, such as lime, and pyroligneous acid, and grinding or mixing all together, and then pressing the same into blocks, substantially as and for the purposes described.

3. The treatment of coal and other minerals of a like nature for the purposes of fuel by adding to them a dry caustic alkaline earth, such as lime, and pyroligneous acid, grinding or mixing all together, and then pressing the same into blocks, substantially as and for the purposes described.

Signed at Middlesbrough, in the County of Yorkshire, England, this 7th day of August, 1897.

ROBERT FERGUSON STRONG.

#### AN IMPROVEMENT IN THE CYANIDE PROCESS OF EXTRACTING GOLD AND SILVER FROM ORES OR COMPOUNDS CONTAINING THE SAME.

I, Alexander McLean Cameron, director and science teacher of the School of Mines, Vincent Street, Daylesford, in the Colony of Victoria, metallurgical chemist, do hereby declare the nature of my invention for "An Improvement in the Cyanide Process of extracting Gold and Silver from Ores or Compounds containing the same," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the extraction of gold and silver from ores or compounds containing the same by means of cyanogen solution, and its main object is to lessen the time required for that operation, to conserve the cyanide, and to increase the extraction. This I accomplish by the addition of an alkaline permanganate or manganate as hereinafter more particularly specified.

According to the well-known cyanide process the ore or other compounds to be treated are very finely ground and preferably neutralised or rendered more or less alkaline before being subjected to the action of the cyanide solution.

In carrying out the process by my invention the same preliminary treatment obtains, and an aqueous solution of an alkaline permanganate or manganate—*e.g.*, potassium, sodium, ammonium, calcium, or other alkaline radical—is prepared and either mixed with the cyanide solution before lixiviation or applied to the material to be treated prior or subsequent thereto. If intended for immediate use the compound solution may be prepared by simply placing the requisite quantity of cyanide and permanganate or manganate in a tank and adding water thereto until it is sufficiently dilute.

The proportions will, of course, vary considerably according to the nature of the material to be treated, but I find that about  $1\frac{1}{2}$  oz. of permanganate and 2.8 lb. of potassium-cyanide, both dissolved in 112 gallons (or 18 cubic feet) of water for every ton of material, is a practical and useful solution.

I wish it to be understood that I do not confine myself to the precise sequence of operations or to the particular proportions specified.

I am aware that prior attempts have been made to hasten or expedite the cyanide process by forcing air through the solution, by the admixture of bromine and other chemicals; but, whilst these attempts have in part accomplished the object sought to be attained, it has been at the expense of the cyanide, whereas by my invention the process is greatly expedited and the cyanide conserved.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is: The improvement in the cyanide process of extracting gold and silver from ores or compounds containing the same, consisting in the use of an alkaline permanganate or manganate in conjunction with a solution containing cyanogen, substantially as and for the purposes herein specified.

Dated this 23rd day of November, 1897.

A. M. CAMERON.

## MINE-MANAGERS' EXAMINATION PAPERS.

## QUESTIONS USED IN EXAMINATION OF FIRST-CLASS MINING MANAGERS.

("The Mining Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[No book will be permitted to be used with the exception of logarithm tables. The candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT A.—*On the Sinking of Shafts and Construction of Main Drives.*

1. Describe the method you would adopt in sinking a shaft when it was known there were 30 ft. of quicksand to go through under a great depth of clay and gravel which could be sunk through by the ordinary methods of timbering.
2. If you had to sink a shaft to cut a quartz lode that was lying at an inclination of  $55^\circ$  from the horizon at a depth of 700 ft., what distance from the outcrop would you commence to sink the shaft? Show by calculation how you arrive at the result.
3. If a lode was outcropping on the side of a range and underlying to the east at an angle of  $60^\circ$  from the horizon, and the slope of the range to the west was  $18^\circ$  from the horizon, what would be the length of an adit level if constructed from the west side to cut the lode so as to have 150 ft. of backs?
4. Describe how you would sink a shaft in hard rock when you had at least 500 gallons of water to contend with per minute and a draw-lift pump to lift the water. (1) What provision would you make to protect a pump when blasting? (2) How would you continue sinking to keep the pump always lifting this quantity of water?
5. Describe, and also show by sketch, how you would widen a shaft which was used for both pumping and winding at the change of lifts, the ordinary size of the pumping compartment being 9 ft. long and 7 ft. wide when there were two plunger-pumps working, each 20 in. in diameter, having one rising column of same diameter. Give the dimensions that the shaft would require to be at the change of lifts to allow the pumps to be placed.
6. If you were working an alluvial mine from a shaft 300 ft. in depth, the auriferous layer of ground being 6 ft. high and the overlying material being very loose and liable to run, describe how you would open out from the shaft and construct a main level to block out the whole of the ground so as to insure the stability of the level; also describe how you would block out the whole of the ground if it comprised an area of 20 chains square.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of Timbering Mines, and also in Filling up Old Workings.*

1. Show by sketch how you would fit the timber for a main level, and give the dimensions of sets of timber for a drive of sufficient size to admit of a single road-way; also describe how you would construct it so as to have places when the empty and full trucks pass, giving the dimensions of these places.
2. If you were constructing a drive through loose alluvial drift, describe how you would keep up the roof to prevent a run taking place; also, how would you put in the timber to prevent more than two sets of timber or slabs coming down in the event of a cap-piece breaking.
3. Show by sketch how you would fit timber in a shaft if it was timbered with frames, and also if timbered with planking. Give the dimensions of a shaft suitable for having two winding compartments and ladder-way. Show how you would fit the timber so as to have neither battens or pegs at the divisions of a slabbed shaft.
4. Show by sketch how you would timber a shaft with planking at the change of lifts if pumps were placed in such a shaft and had to be widened. Describe, and also show by sketch, how you would turn the width to the ordinary width of the shaft under the pumping lifts.
5. How do you ascertain the breaking strain of beams or cap-pieces used in connection with mines? Show by calculation the breaking strain on a cap-piece of kauri, 12 in. in diameter, 8 ft. between supports, and uniformly loaded. Show by calculation the breaking strain on a prop 8 in. in diameter and 10 ft. long.
6. Show by sketch how you would fit the timber for passes, giving the dimensions and the distance that the passes should be apart, and give your reasons fully.
7. How would you fit guides in a shaft to work cages? Give the size of the guides, the method of fixing them, and how you would join the ends together.
8. If you met with a flow of water on striking the solid rock after sinking through 30 ft. of alluvial drift, what steps would you take to prevent the water following down the shaft, and describe the system of timbering that you would adopt if you used planking in the shaft.

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT E.—*On the Ventilation of Mines.*

1. State the gases generated in metalliferous mines in which operations are being conducted, their composition, and weight in relation to air.
2. What means should be adopted to remove the gases from the different levels in a mine worked from a shaft, and also to provide a supply of fresh air in the workings?
3. Describe the systems of mechanical ventilation in general use.
4. State what experience you have had in respect to mechanical ventilation.
5. What quantity of air is required to circulate in a drive 6 ft. by 3 ft. to dilute  $\text{CO}_2$ , given off at the rate of 10 cubic feet per minute?

## SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT F.—*Tapping Water in Mines, and Mode of constructing Dams in Underground Working.*

1. State how you would construct a dam in a drive in solid rock to dam the water up to a height of 6 ft.; also describe how you would construct a dam in same drive if the water had to be held back up to a height of 250 ft.

2. If the face of a dam was 6 ft. by 7 ft., and it had to withstand a pressure of water which stood up to a height of 400 ft., show by calculation the pressure in pounds that would be on the face of the dam.

3. In sinking a shaft through solid rock where a horizontal fissure was met with at a depth of 200 ft. from which there was a quantity of water issuing, describe how you would dam it back to prevent it getting down the shaft.

4. In approaching a place where there was a lodgment of water, what precaution would you take—(1) If you were approaching it by a drive in alluvial ground requiring to be timbered; state how you would secure the drive; (2) If the drive were in a solid rock. How would you proceed in both instances?

SUBJECT G.—*On Blasting and the Use of Explosives.*

1. When dynamite is in a frozen state how would you use it as an explosive? Can proper combustion be effected? If so, state how it could be accomplished.

2. Give the relative strength of dynamite, rackarock, gelignite, and roburite in relation to gunpowder.

3. Describe how you would prepare rackarock cartridges to use as an explosive, and give its composition.

4. If a shot missed fire what steps would you take? And how would you proceed to work in the same place?

5. Describe how you would tamp a hole, the materials and appliances you would use for tamping, both for blasting-powder and dynamite.

6. Show by calculation the pressure the expansion of gases liberated by an explosion of gunpowder would exert per square inch at a temperature of 64° Fahr.

## THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT I.—*A Knowledge of Underground Surveying, and the Making of Plans of Underground Workings, showing also the Dip or Inclination and Strike of the Reefs or Lodes.*

(a.) The candidate must produce a plan drawn to a scale not less than 5 chains to an inch, showing the surface boundaries of a mining claim not less than 20 acres in extent. The plan must also show the underground workings on the same plan, but in different coloured inks. All traverse-lines on which the survey is based must be shown, with their bearings and lengths, all offsets to boundaries or other objects, together with the lines connecting the underground with the surface survey. The plan must have a north point, and the word "magnetic" or "true" written on it according to the meridian used. All traverses should be calculated from the starting-point or a trig. station. The plan must bear a certificate as follows: "I certify that the survey from which this plan has been drawn was done by myself, and that the plan is my own work also"; and it must be signed and dated. The area in acres must be shown. The survey must be actually closed on the ground. Calculated closures are not admissible.

(b.) The original field-notes of the survey must be produced, together with the tables of meridian and perpendicular distances (if any) for each traverse station in the survey; also produce a specimen of the method of calculations from which the positions have been derived. All of these must be signed by the candidate and dated.

(c.) Give a full description, in writing, of the method adopted in the survey, describing the initial point from which it was started, and show the close of the work, both in links or feet, and the angular difference on closing. Describe how the incline measurements were reduced to horizontal. State whether the true or what other meridian was used, and whether the same meridian was used both above and below ground.

(d.) Say what precautions were used to ascertain if the instrument was in adjustment, and how the length of the chain or tape was tested. Did you adjust the instrument yourself, and test the chain or tape yourself? What adjustments were tested? [A full description of the usual adjustments is to be given under heading (i).] What instrument was used for the angular measurements, and what for the linear measurements?

(e.) Draw a rough diagram to show how the surface and underground surveys were connected, and describe in writing the method adopted. State your opinion of the most accurate way of performing the above operation—first, when there is only one shaft; second, when there are two or more shafts. State what parts of the operation require the most care, and what precautions should be taken to insure accuracy in carrying the meridian down shafts.

## THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT I.—*continued.*

(f.) State whether the compass can be relied on for underground surveys, and give your reasons for the answer. If you had a choice of a compass or a theodolite, which would you use?

(g.) If you are obliged to make a magnetic underground survey, state what means you would use to check the correctness of the survey, and how you would know that the surface and under-



ground survey are on the same meridian, or how you would reduce them to the same supposing one to be magnetic, the other true.

(h.) From the last station used in the underground survey, calculate the length and bearing of a line drawn thence to any one of the corners of the claim; or a line may be calculated from any one station of the surface survey to any one corner of the claim.

(i.) Describe in writing the adjustments of a plane theodolite under the headings of: "Horizontal Level," "Vertical Level," "Collimation," "Parallax"; and state what others are necessary. Also describe a miner's compass and its adjustments. (In both of these subjects the candidate will be examined by the Supervisor, who must furnish a separate report on each candidate's knowledge of the subject.)

(j.) Describe the method of plotting the plan, and how the area of the claim was ascertained, and what instruments were used.

(k.) What are the regulation marks that should define the boundaries of a claim under the Mines Act, and state sizes?

(l.) State where you learnt surveying, and who taught you, and how long you have had practice at surveying.

#### FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

[No books will be permitted to be used with the exception of logarithm tables. The candidates must attempt to answer every question. All calculations to be shown in detail.]

##### SUBJECT C.—*On the Drainage of Mines and Pumping Appliances.*

1. What does the term "modulus" applied to a pump mean?
2. What is about the modulus of the centrifugal, low-lift, ordinary-lift, and force pumps?
3. How many cubic feet of water is a 6-horse-power steam-pump capable of lifting per hour to a height of 20 ft., efficiency = .66?
4. A 6-horse-power steam-pump lifts 6,273 cubic feet of water per hour to a height of 20 ft. What is the modulus of the pump?
5. Which class of pumps are most economical for low lifts?
6. Which class of pumps are most economical for deep lifts?
7. Required the indicated horse-power of an engine to pump 6,273 cubic feet of water per hour from a depth 20 ft., efficiency = .66?
8. How many 3 in. pipes would I require to equal a 12 in. pipe?

##### SUBJECT D.—*On the Haulage in Shafts and in Underground Planes; also on the Strength of Hauling-ropes and -chains.*

1. What means are adopted to prevent overwinding?
2. Describe any method of signalling that could be used for raising men and materials from a mine.
3. Describe any system of underground haulage.
4. What horse-power would be required to lift 200 tons per hour 1,000 ft., each lift occupying  $1\frac{1}{2}$  minutes, weight of cage, &c., =  $2\frac{1}{2}$  tons?
5. What is the breaking-weight of a 3 in. ordinary wire rope?
6. Does galvanising a wire rope reduce its strength? Why?
7. What is the working-load on a  $\frac{3}{4}$  short-linked chain?
8. Does a chain get brittle by constant use? How can it be restored to its original condition?

#### FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

##### SUBJECT H.—*The Effect that Faults, Slides, and Mullock-bars have on Lodes, and how to ascertain the Direction of Slides and Heavals.*

Give six diagrams, with fully written explanations, to illustrate the effect that is exercised on mineral lodes by faults, slides, and mullock-bars; and describe instances from your personal observations.

##### SUBJECT J.—*A Knowledge of the Different Rocks where Gold, Silver, Tin, Copper, Zinc, Lead, and Antimony are found, and on the Formation of Lodes and Leads.*

1. What metallic ores are usually associated with granite slate, propolyte, serpentine, and limestone respectively?
2. What is the composition of the chief ores of silver, lead, tin, antimony, copper, and zinc, and where are they found in New Zealand?

##### SUBJECT K.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. Divide .004397 by .000349, and extract the cube root of the quotient.
2. If 4 men accomplished a certain piece of work in 5 days 3 hours, working 9 hours per day, how long would it take 9 men to do the same work?
3. The wages of 24 men and 9 boys for 24 days' work amounted to £254; each boy was paid  $\frac{2}{3}$ ths of a man's wage. How much did each man and boy receive?
4. Three hundred tons of ore were treated, having an assay-value of £3 14s. 9d. per ton; the bullion contained 13 per cent. of gold, worth £4 per ounce; and the balance was silver, worth 2s.

per ounce; 95 per cent. of the gold was saved, and 45 per cent. of the silver. What was the value of the bullion recovered?

5. There were 189 props, 97 caps, and 269 slabs delivered at a mine; the value of the props was £4 12s. 6d. per 100, the caps £5 18s. 9d. per 100, and the slabs £1 12s. 6d. per 100. Give the value of the whole.

6. A piece of sawn timber is 79 ft. long, cut taper, being 2 ft. 3 in. square at one end and 15 in. square at the other end; the contract price for the same was 14s. 6d. per 100 superficial feet. How many feet are there in the piece, and how much did it cost?

SUBJECT L.—*A Knowledge of Part VI. of "The Mining Act, 1891."*

Oral.

FOURTH DAY.—TIME: 5 P.M.

SUBJECT L.—*Oral Examination on Part VI. of "The Mining Act, 1891."*

1. What are the exceptions in being liable to a penalty for acting as a mine-manager without a certificate?
2. What persons are prohibited from being employed for hire in or about any mine?
3. State in what manner explosive or inflammable substances should be stored—(1) on the surface, (2) in the workings of a mine.
4. State what parts in a mine worked from a shaft must be securely fenced or securely covered.
5. From and to what parts of a mine worked from a shaft shall some proper means of communicating distinct and definite signals be provided?
6. State what parts of machinery should be kept securely and safely fenced.
7. What is the time appointed—(1) for examining the state of safety-appliances and gear connected with the cages, winding-ropes, &c., (2) for the general examination of buildings, machinery, shafts, &c., and the record of such examination?
8. State—(1) what is the duty of any person employed in or about any mine before commencing work, (2) what steps he should take if anything is found unsafe.
9. What is set down as the instructions to the mining manager of a mine after the occurrence of any accident attended with serious injury to any person?

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.

("The Mining Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT A.—*The Laying-out and Construction of Shafts, Chambers, Main Drives or Levels, Uprises, and Stopes.*

1. In laying out the position of a vertical shaft to work a lode dipping at an inclination of 45° eastward, if the outcrop of the lode was seen on the surface, state where you would sink the shaft in relation to the lode, giving your reasons fully.
2. If you had to drive an adit in a westerly direction to cut a lode which was underlying 50° to the westward, and the angle on the fall of the range was 25°, and the mouth of the adit being 300 ft. distant from the outcrop, what would be the length of the adit to cut the lode at 100 ft. in depth below the surface?
3. Give the dimensions of a main level or drive for a double line of rails, and also the dimensions of a chamber you would construct if there were forty men employed in each shift below ground.
4. What is meant by a "pass"? What is its use, and how would you construct one; and what distance would you have "passes" apart if you were working a lode 6 ft. in width?
5. If a quartz lode were dipping on an inclination of 9½ in. to any foot vertical, and you were to sink a vertical shaft on the outcrop of the lode on the surface to a depth of 600 ft., what distance would you have to drive from the bottom of the shaft to cut the lode?

SUBJECT C.—*On the Ventilation of Mines.*

1. What is meant by "ventilation"? Why is it required? What quantity of air is required by the Mines Act for every man employed in a mine?
2. If you had carbonic-acid gas in a quartz-mine, give its composition, and state how you would detect its presence; also state what effect water has (if any) in absorbing this gas. Give your reasons fully.
3. How is ventilation produced—(a) by natural means; (b) by mechanical means? State fully how you would produce it by both systems.
4. How would you ascertain when the air in a mine is deleterious and unfit for workmen to be employed therein if you had carbonic-acid gas to contend with?

## FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of Timbering Mines, and also in Filling up Old Workings.*

1. Give the dimensions of timber for a main adit in heavy ground—(a) if for a double line of rails, (b) for a single line of rails. State how you would make each set, and what provision you would make if the ground was liable to swell. Give your reasons fully.
2. How far apart do you consider it most economical to have passes, and how would you timber them in heavy ground? Give dimensions of passes, and size of timbers. Give your reasons fully.
3. State how you would timber a shaft with formed sets if the shaft was 12 ft. by 6 ft. in the clear; give the dimensions of timber you would use; and show by sketch how you would fit the timber, and the distance you would place the sets apart if the ground was heavy.
4. How would you secure the ground in stoping out a lode 6 ft. wide—(a) timbering the stope, (b) to secure the ground after being stoped out—if the ground was liable to crush, and the lode underlying at an angle of  $40^\circ$ ?
5. Describe how you would secure the timber in a main adit so as to prevent more than two sets of laths coming down in the event of a cap breaking; also give your reasons why all empty spaces should be filled up on the top of the laths.

SUBJECT D.—*Tapping Water in Mines.*

1. What precaution would you take if you were constructing a drive to connect with old workings where it was known there was a lodgment of water?
2. Describe fully how you would construct a dam in a drive in solid rock to keep water back if it had to rise 100 ft. above the level of the drive, and what material you would use.
3. In approaching a place where there was a lodgment of water by a drive or adit, and the ground was of a loose character, how would you secure it to render operations being carried on with safety? Describe how you would secure the timber in a drive before tapping the water.

## SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT E.—*On Blasting and the Use of Explosives.*

1. What explosives do you consider the best to use in cross-cutting in hard rock? Give your reasons fully.
2. What is the relative strength of dynamite, rackarock, compressed powder, and blasting-gelatine in comparison with the ordinary blasting-powder?
3. What method would you use to thaw dynamite when in a frozen condition, and at what temperature does it freeze?
4. What explosive do you consider the best to use in wet and hard ground? Give your reasons fully.
5. If a shot were to miss fire, what precautions would you take, and how would you proceed to disintegrate the rock that the miss-charge was in?

SUBJECT F.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. If 12 men could earn £180 by working 10 hours a day, how many men could earn £300 by working 8 hours a day?
2. If a man took 25 days to do a piece of work, and received £2 8s. a week of 48 hours, what would the work cost?
3. If repairs to a shaft took 3 men 35 days, and cost £44, how long would it take 7 men to do it; and what would be the difference in the cost if the men received 8s. 6d. a day?
4. If 150 tons of ore assaying 2 oz. 4 dwt. 12 gr. per ton only yielded 280 oz. 7 dwt. by battery treatment, what is the percentage-recovery?
5. If a lode were 4 ft. 2 in. at one end, and gradually tapered till it was 1 ft. 10 in. at a distance of 88 ft., being also 42 ft. high, how many cubic yards would it contain?

SUBJECT G.—*A Knowledge of Part VI. of "The Mining Act, 1891."*

Oral.

## QUESTIONS USED IN EXAMINATION OF BATTERY SUPERINTENDENTS FOR CERTIFICATES.

("The Mining Act Amendment Act, 1894.")

## FIRST DAY.—TIME: 9 A.M. TO 1 P.M.

[The candidates will not be allowed any books other than logarithm tables during the time they are sitting for examination. They must attempt to answer every question, and all calculations must be shown in detail.]

SUBJECT A.—*The Different Modes of Reducing and Pulverising Ores.*

1. State what experience you have had in ore-crushing plants. Give the name of the company you were employed by, and the period and date you have been so employed.
2. Describe the difference between a Blake-Marsden ore-crusher and a Gates's crusher, and the action of each.

3. A crushing battery having forty stamps of 1,000 lb. each makes ninety-seven blows per minute, and has a drop of 7 in. at each blow: show by calculation the force exerted in foot pounds.

4. The head and shoe of a stamp is 21 in. long, and 9 in. in diameter, of cast-iron, and the stem is of wrought-iron, 14 ft. long,  $3\frac{1}{2}$  in. in diameter: show by calculation the weight in pounds of the head, shoes, and stem.

5. Describe a Huntington mill of 5 ft. diameter, and give a detail of the different parts and appliances required to be fixed in conjunction with this mill as an ore-pulveriser.

6. Describe and also show by sketch a mortar-box suitable for dry-crushing, and the automatic appliances used to convey the pulverised ore into a bin.

7. If gold were very finely disseminated through the ore, what mesh of screens would you use for dry-crushing? and give your reasons fully.

8. What are the advantages or disadvantages of using stamps for pulverising the ore when it has to be treated with cyanide solutions?

**SUBJECT B.—*Amalgamating-machines.***

1. Show by sketch an amalgam-trap, and describe how it is placed and applied.

2. Give the speed that Wheeler's, McKay's, and combination-pans require to be worked, and horse-power required to work them, and quantity of material they are capable of operating on in twenty-four hours.

3. What is the difference between a Watson-Denny pan and a combination-pan? Describe fully.

4. Show by sketch a berdan, and describe its action, the quantity of quicksilver you would use in it, the speed and angle at which it is set, and give the horse-power required to work it.

5. Describe the King amalgamator, and its action, giving its speed, and all details.

6. What are settlers used for? Give their dimensions, and describe fully how they work.

**FIRST DAY.—TIME: 2 P.M. TO 5 P.M.**

**SUBJECT C.—*The Use of Quicksilver and the Methods of using it in connection with the Extraction of Gold and Silver from Ores.***

1. Describe how you would clean copper plates and coat them with quicksilver; also how you would remove gold amalgam.

2. What is the chemical effect of using chloride of sodium and sulphate of copper in pan-amalgamation? What are the advantages or disadvantages in using these salts?

3. What effect has an electrical action on quicksilver used for amalgamating purposes, and how is it applied?

4. What class of auriferous and argentiferous ores are best suited for the recovery of the gold and silver by amalgamation?

5. What effect have ores containing sulphides of zinc and antimony on quicksilver used for amalgamation of the gold and silver the ore contains?

6. Describe how you would separate the gold and silver from quicksilver when in the form of amalgam; also how you would purify quicksilver charged with base metals.

**SUBJECT E.—*Chlorination Process of Recovering Gold from Ores.***

1. What class of ore is best suited for chlorination? State fully, giving your reasons why.

2. Describe a modern chlorination plant, giving all details, and show the advantages it has over the Plattner chlorination process, giving the time and quantity of material operated on in each charge.

3. Describe the different methods by which chlorine gas is generated, giving the composition of chemicals used, and also state how it is applied to the ore.

4. State the different processes used for precipitating the gold from chlorine solutions, giving full details.

5. How would you recover any silver that was in ores treated by chlorination? Describe the process you would use fully.

6. Show by sketch a modern chlorination plant, with all appliances, with distinguishing letters on each part.

7. Describe how you would roast ore in a reverberatory furnace. Give full details of the process, and state what chemicals you would use (if any), and give the reason why, and the action that the chemicals used produce on the ore.

8. Describe how ores are roasted in the Bruckner, White-Howell, and Stedtefelt furnaces, and give the action of each.

**SECOND DAY.—TIME: 9 A.M. TO 1 P.M.**

**SUBJECT D.—*Lixiviation Process of Recovering Gold and Silver from Ores.***

1. Show by sketch a cyanide plant with five percolating-vats for treating auriferous and argentiferous ores, and give full details as to the dimensions of each part, and how it is placed.

2. Describe the whole process of treating ores with cyanide solutions, and how you would prepare a strong solution, and the method of dissolving the salt.

3. How would you ascertain the strength of a cyanide solution? Describe fully.

4. State how gold and silver are precipitated from cyanide solutions, and the different methods adopted, giving full details.

5. State how you arrive at the strength of the cyanide solutions best suited to the class of ore you have to deal with.

6. How many tons of a 19-per-cent. KCN solution would you require to make up 30 tons of a sump solution containing 0·02-per-cent. to a 0·25-per-cent. solution?
7. Describe how you would ascertain the value of sump solution, and the methods of testing them.
8. How would you prepare a silver-nitrate standard solution?
9. If a vat were 22 ft. 6 in. in diameter, and filled with ore to a depth of 22 in., how many cubic yards would it contain? Also give the weight of solution occupying 11½ in. of the vat.
10. If 4 tons of wash-water contained 0·04-per-cent. KCN, how many pounds of KCN would be required to make up a 0·3 solution, supposing you were using crude KCN salt containing 73 per cent. of KCN?
11. How many tons of a 0·63-per-cent. KCN solution would be required to make up 50 tons of a 0·15-per-cent. solution, using a sump solution containing 0·007-per-cent. KCN?
12. How many tons of a 0·18-per-cent. solution could be obtained from 9 tons of a 6-per-cent. KCN solution?
13. Describe the class of auriferous and argentiferous ores best suited for treatment by cyanide solutions.
14. What effect have base metals in ores containing gold and silver in the treatment of the latter by cyanide solutions; also give the solubility of copper, zinc, antimony, and lead in relation to the solubility of gold in cyanide solutions?
15. Give the reasons why so large a percentage of silver in the form of sulphides cannot be recovered from cyanide solutions as when the silver is in the form of chlorides.
16. How would you neutralise ores containing acids, and state whether this is required for the treatment of ore by cyanide solutions? and, if so, give your reasons fully.
17. If any one were poisoned by cyanide solutions, what would you do, and what antidote would you apply?

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT F.—*Sampling and Testing of Ores.*

1. How would you determine the special character of mine-water?
2. What are the usual tests for copper?
3. How would you test for the presence of nickel and cobalt?
4. Give the special tests for lead.
5. How would you assay a poor galena in a matrix of pyritous quartz?
6. Give the test for manganese by the pyro, also by the wet, process.
7. What are the tests for sulphur as combined with the metals generally?
8. How would you determine the proportion of copper in the oxide; also in its sulphide?
9. Describe the characteristic reactions of zinc.

SUBJECT G.—*Knowledge of Arithmetic and Method of keeping Accounts.*

1. Divide 0·3567 by 0·8434, and extract the cube root of the quotient.
2. If 44 oz. 13 dwt. of gold of 24 carats fine were worth £178 12s., what would be the value of this quantity of gold if it were only 15·8 carats fine?
3. A pole is 100 ft. long standing vertical; the top of it breaks off without actually parting, and touches the ground on the same level as its base at a distance of 34 ft. from the base: give the length of the two pieces—that is, the perpendicular and hypotenuse.
4. If ore assays before treatment 2 oz. 16 dwt. 5 gr. gold and 16 oz. 2 dwt. 15 gr. silver to the ton, what percentage would be saved from the treatment of 100 tons of ore if only 74·3 per cent. of the gold were saved and 35·9 per cent. of the silver?
5. If 9 men and 5 boys were employed for 14 days 3 hours to do a certain piece of work, the work the men did was equal to 1½ times as much as the boys, how long would it take 15 men to do the same quantity of work?
6. A building is 30 ft. high vertical, but the ground is sloping downwards on a gradient of 1 in 9·3: required the length of a ladder that would reach the top of the building when the bottom was standing on the sloping ground 23 ft. 3½ in. on the slope from the bottom of the wall.

#### QUESTIONS USED IN EXAMINATION OF MINE MANAGERS FOR FIRST-CLASS CERTIFICATES.

("The Coal-mines Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT I.—*On the Sinking of Shafts and Construction of Main Roadways, Opening-out a Mine, and the Division of a Mine into Districts.*

1. Describe the method of sinking a pit through water-bearing strata, having very soft ground to commence with, giving sketches, and dimensions of the materials you would use for a shaft 14 ft. in diameter.
2. Draw a ground plan showing surface arrangements of an independent average-sized colliery fully equipped—say, for 500 tons per day of eight hours.
3. How would you secure a main drawing road with heavy side-pressure and soft roof? Road of the following dimensions: 8 ft. by 6 ft. in the clear. Give sizes of material used.
4. Explain what is meant by pillar and stall working, and what advantage is there in having the workings laid out in districts.

**SUBJECT II.**—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing the Relative Advantage and Efficiency of each Class of Material used.*

1. Show (with sketches) some of the various modes of setting timber in a mine, and state the advantages of each.
2. Upon what system would you work a mine liable to spontaneous combustion, and how would you deal with a gob fire in such a mine?
3. What are the chief points to be considered in selecting a system (pillar, stall, or long-wall) in working a coal-seam?
4. How is creep and thrust brought on, and what would you do to prevent it?
5. Describe the mode of working thick coal-seams lying at an angle of over 40 degrees.

---

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

**SUBJECT III.**—*The Various Methods of hewing and cutting Coal of Different Classes to advantage, and securing the Ground while so engaged.*

1. Make a sketch of a section of stoping showing the arrangements of lifts, &c.; pillars, 30 yards by 20 yards.
2. Sketch and describe fully some methods of working narrow-edge (highly inclined) seams of coal.
3. Do you consider a pillar as strong if it has hard ribs of stone or coal and soft ones alternately as one of uniform density? Give your reasons.
4. Enumerate the circumstances which govern the size of pillars to be left.
5. What rules should be laid down to prevent accidents from falls of roof and shot-firing?

**SUBJECT IV.**—*The Various Methods of Ventilation, and the Construction of Airways so as to produce a Good Circulation of Fresh Air in any Part of a Mine.*

1. Do changes in the barometer affect the issue of gases in the underground workings of a coal-mine?
2. Describe with sketches the construction of an air-crossing to pass 20,000 cubic feet of air per minute, giving sizes of material used.
3. What precautions are to be taken in laying out the ventilation of a coal-mine, as to length, size, and form of splits, and number of splits, crossings, doors, stopings, &c.
4. Describe with a sketch any furnace or ventilating-fan you are acquainted with, and state its advantages.
5. What methods have been proposed for detecting small quantities of gas in the air of coal-mines?

---

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

**SUBJECT V.**—*On the Areas of Airways, the Velocity and Divisions of Currents, and the Deductions to be made for Friction.*

1. If 6-horse power be required to circulate 20,000 cubic feet of air in a mine, what horse-power must be employed to pass 35,000 cubic feet through it, the airways remaining in the same condition?
2. State the benefits from splitting the air. Where should the splits be to obtain the greatest advantage, and where should they join again?
3. In opening up a new mine where the measures have an average dip of 15°, it is proposed to work three coal-seams. State how you would open the slope and fanway and other openings, and how you would conduct your air-current.
4. What is the most effective method of dealing with firedamp in mines?
5. Upon what does natural ventilation depend; is it reliable, and, if not, why not?

**SUBJECT VI.**—*On the Nature and Composition of Explosive and Dangerous Gases occurring in Coal-mines, and on Spontaneous Combustion.*

1. After an explosion of firedamp what gases result?
2. Enumerate the noxious gases found in collieries, and state the specific gravity and composition of each.
3. Describe the principle of the safety-lamp, and the construction of one of the safest form.
4. What are the principal nitro-compounds used as explosives, and what methods have been proposed to prevent flame in the use of explosives in collieries?
5. How does spontaneous combustion occur in coal-mines?

---

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

**SUBJECT VII.**—*On the Drainage of Mines, and Pumping Appliances.*

1. What arrangements are necessary for renewing the wearing parts of mine-pumps and generally for keeping the pit-work in order?
2. Explain by means of ink sketches the difference between a "force" or plunger pump and a "lifting" or bucket pump.
3. What size of pumps and engine would you erect to pump 600 gallons of water per minute from a depth of 720 ft.? Give a general description of the engine you prefer with the principal sizes.

4. Find pressure on a dam 8 ft. wide by 4 ft. high. Head of water 87 yards.
5. Make a simple sketch, and describe the action, of Moore's hydraulic pump or other you are conversant with.

SUBJECT VIII.—*The Haulage on Planes and in Shafts; also the Different Systems of Underground Haulage, with Horse-power required to do the Work.*

1. Find size of ropes and cylinder of engine, and what kind of engine you would use to raise 800 tons of coal per day from a depth of 400 yards. Give the length of stroke of engine, diameter of drum and pulleys, weight of cage, coals, hutches, and rope.
2. Make a neat sketch of a carriage for winding in steep seams, marking on the principal sizes.
3. Describe some form of endless-rope haulage, showing how branches are taken off, hutches conducted round curves, and how fixed to rope, and form of driving-wheel used.
4. Find the resistance in moving a run of five full hutches along a level road if the co-efficient of friction is  $\frac{1}{10}$  of the load and each full hutch weighs 16 cwt.
5. What are the different strains a winding-rope is subjected to? How may these strains be averted?

---

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT IX.—*The Theoretical and Effective Power of Steam-engines and Boilers; also on the Strength of Hauling-ropes and -chains.*

1. Can you describe the usual appendages to colliery boilers, their utility, and what are the requirements of "The Coal-mines Act, 1891," with reference to them?
2. The area of the piston of a steam-engine is 500 square inches; the mean effective pressure of the steam is 30 lb.; the length of stroke 8 ft., with twenty strokes per minute: required the horse-power.
3. Find the safe working-pressure of a boiler,  $\frac{3}{8}$  in. plates, wrought-iron, and 54 in. diameter; also steel—(a) single, (b) double riveted.
4. Suppose a weight for cage, boxes, &c., and find what size of round rope, crucible steel, you would use for a depth of 600 ft.
5. What size of chain would you use for a lift of 9 tons? Give its weight.

SUBJECT X.—*The Incrustations in Steam-boilers and Cause of same, and the Remedy therefor.*

1. State what are some of the most important duties of a fireman or boiler attendant.
2. What are the causes of internal corrosion in boilers, and how may it be prevented?
3. Enumerate the dangers that may arise through boilers "priming," and how they may be overcome.
4. Describe the action of the Griffiths injector.
5. What is meant by the term "grooving," and in what position is such generally found?

---

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XI.—*Tapping Water in Mines, and the Mode of constructing Dams in Underground Workings to keep Water back.*

1. What is the pressure on a ram per square inch with a head of 600 ft. of water?
2. Required the total pressure on a 10 ft. by 5 ft. dam placed at bottom of incline drive; length of incline drive, 600 yards, with an average angle of  $10^\circ$  from the horizontal.
3. What are the requirements of the Act with respect to approaching abandoned workings known to contain a body of water?

SUBJECT XII.—*Blasting and Use of Explosives.*

1. What is an explosive? Describe its action.
2. Describe the operation of charging and firing shots in a sinking pit (dynamite and gunpowder).
3. Enumerate the necessary precautions which should be taken in the charging and firing of shots in a dry, dusty mine.

SUBJECT XIII.—*The Effect that Faults produce in Coal-seams, and how to ascertain the Direction of a Coal-seam when severed by a Fault.*

1. Explain by sketches the difference between "synclinal" and "anticlinal," and give an example of an anticlinal fault, and say what is the effect of it in any district you know.
2. Illustrate by sketches in ink the way in which coal-seams are often "thrown" by faults and igneous dykes, and explain the common effect of such faults and dykes upon the adjacent coal.
3. When a seam of coal is cut off by a fault, what operations are necessary to prove the throw?
4. Describe concisely the geology of some coalfield or colliery that you are acquainted with.

---

FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT XIV.—*A Knowledge of the Composition and Character of the Different Classes of Coal, and also of the Character of the Rocks and Formation of the Country where Coal is likely to be found.*

1. In what formations is coal found besides the coal-measures? Do such coals differ from those of the Carboniferous period?

2. Describe the general character and structure of a coal-seam and its associated strata.
3. Explain the difference between the terms bituminous, free-burning, smokeless, and brown coals.
4. In what way is geology of use in the art of mining?
5. What is understood by the terms aqueous, sedimentary, and stratified?

SUBJECT XV.—*A Knowledge of Surface and Underground Surveying, and of making Plans, showing System of Working, Inclination of Seam, Faults, and System of Ventilation.*

1. Candidate must produce plan showing the system of working in a colliery with the surface taken up for at least 20 acres in the vicinity of the shaft, and the underground workings in different-coloured ink. He must describe how he would connect them with the surface in the event of there being only one shaft. The levels and main headways must have assumed traverse calculated in detail, and showing latitude and departure for each bearing.
2. Describe fully how you would make an underground survey with the magnetic (loose) needle, and show your method of booking it?
3. The level course of a seam is due east and west, and dips due south at 1 in 5. A road is driven in the seam  $45^\circ$  north-east. What is the gradient?
4. In a shaft there are two seams of coal 39 ft. apart, and dipping 1 in  $4\frac{1}{2}$ . What length must the drive be to connect the two seams, coming from the bottom seam and rising 1 in 8, and an upthrow fault of 25 ft. lying across the drive?
5. Plot the following bearings: N.E.  $10^\circ$ , 205 links; N.E.  $6^\circ$ , 157 links; N.W.  $4^\circ$ , 96 links; N.W.  $5^\circ$ , 103 links; N.W.  $89^\circ$ , 87 links; S.E.  $5^\circ$ , 103 links; S.W.  $80^\circ$ , 205 links; S.E.  $45^\circ$ , 96 links; S.E.  $89^\circ$ , 87 links; S.W.  $6^\circ$ , 157 links. Join the last and first station and give the bearing.

---

FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XVI.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. A collier has 10s. 3d. per day, and is reduced 12 per cent.: find his fortnight's wages for eleven days after the reduction.
2. How many cubic yards are in a shaft 600 ft. deep and 13 ft. diameter?
3. How many gallons of water will a 12 in. bucket deliver per hour if the stroke is 7 ft. and makes seven strokes per minute; slip, 10 per cent.?
4. Find the square root of  $\frac{1}{2}$ , and also of 11,025.
5. An oblong pit is 24 ft. by 7 ft.: find diameter of circular shaft to have the same area.

SUBJECT XVII.—*A Knowledge of the Provisions of "The Coal-mines Act, 1891."*

1. Describe the provisions of the Coal-mines Regulation Act—(1) With regard to ventilation; (2) with regard to reporting accidents; (3) with regard to shaft-signals; (4) inspection of shafts; (5) inspection of machinery.
2. What are the principal points to be observed in the management of a fiery mine to comply with the Coal-mines Regulation Act, inspection, fixed stations, use of explosives, &c.? Enumerate all the requirements of the Act with regard to survey and plans.
8. What are the provisions of the Act with regard to fencing abandoned workings, providing refuge-holes, providing second outlet, timbering of roads and places, setting of sprags while undercutting, approaching old workings?

[Supervisor to be good enough to report result of this oral examination.]

---

#### QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.

("The Coal-mines Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT I.—*On the Sinking of Shafts and Construction of Main Roadways, Opening-out of a Mine, and the Division of a Mine into Districts.*

1. Describe the necessary fittings required for the starting of a new shaft, and explain the operation of sinking to the stone head, and kind of timbering you would use in supporting walls of shaft until walling put in.
2. What do you consider a good method of lighting shots in a sinking-shaft; and what precautions are necessary to prevent accident in connection with shot-firing? Give particulars of any improved method of shot-firing of which you have had experience.
3. What means are generally adopted to make sure of getting good solid beds for walling-rings in a sinking-shaft?

SUBJECT II.—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing the Relative Advantages and Efficiency of each Class of Material used.*

1. In putting in brick lining in a shaft, what precautions would you adopt to secure safety of men working on scaffold? State how you would secure scaffold when in use.
2. Sketch set of timber suitable for ground where side pressure very considerable.
3. How would you timber the bottom of a winding-shaft where the roof is strong and sides and floor weak?

27—C. 3.



4. In what system of working coal are chocks used in preference to prop-wood? What are the advantages of using timber in this form?

5. What fittings are required for relieving the cast-iron tubing used in shafts from the pressure of water during time the tubing is being fixed in position?

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT III.—*The Various Methods of hewing and cutting Coal of Different Classes to advantage, and securing Ground while so engaged.*

1. Describe the mode of working any seam of coal with which you are acquainted, and show by sketches the position of main level and branch headings.

2. What size pillars would you leave to support shaft 200 yards deep, seam pitching at an angle of 14 degrees?

3. The greater number of accidents are due to falls of roof and sides in working-places. State what, in your opinion, is productive of such accidents, and how they may be prevented.

4. What does the Coal-mines Act require as to the inspection of mines before starting work?

5. What precautions should you take with regard to missed shots?

SUBJECT IV.—*The Various Methods of Ventilation, and the Construction of Airways so as to produce a Good Circulation of Fresh Air in any Part of a Mine.*

1. What size would you make an airway to pass 10,000 cubic feet of air per minute, at a velocity of 4 ft. per second?

2. State your views as to how a mine is affected during a heavy fall of the barometer?

3. What are the most dangerous gases commonly met with in coal-mines? Why are they dangerous? And state which of these you have had most experience of.

4. What is the duty of a manager as regards ventilation, and what is the minimum quantity of air which should circulate per man employed in non-fiery mines?

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT V.—*On the Area of Airways, the Velocity and Division of Currents, and the Deductions to be made for Friction.*

1. State the general laws relating to the friction of air in mines.

2. What quantity of air per minute will pass through a shaft or circular airway 10 ft. diameter, speed of current being 5 ft. per second?

3. Explain use of water-gauge, and state when it should be fixed to ascertain the drag of the mine.

4. Sketch air-crossing or bridge for carrying main return over the intake airway: say how you would construct such, and material to be employed.

5. Have you any knowledge of the construction of "ventilating-fans"? Describe such a fan as you may have had experience of.

SUBJECT VI.—*On the Nature and Composition of Explosives and Dangerous Gases occurring in Coal-mines, and on Spontaneous Combustion.*

1. Describe the best type of safety-lamp of which you have had experience.

2. Have you any knowledge of high explosives in use in coal-mines? Describe such, and give composition.

3. In what position would you expect to find black-damp or carbonic acid in a coal-mine, and what are the causes tending to the production of this gas?

4. Have you had experience of underground fires? If so, describe what, in your opinion, led up to the firing; and state generally your views as to spontaneous combustion, and best means of dealing with a mine so circumstanced.

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT VII.—*On the Drainage of Mines, and Pumping Appliances.*

1. What are the conditions which would decide you to wind the water from a shaft, in preference to pumping?

2. What are the conditions rendering the fixing of a direct-acting pump at shaft-bottom preferable to putting a pumping-engine at surface?

3. A shaft 100 fathoms, from which it is required to pump 100 gallons per minute, the engine being placed on surface: how many lifts would you apply? and sketch arrangement where lifts junction.

4. Give your experience of the erection and working of pumping appliances.

SUBJECT VIII.—*The Haulage on Planes and in Shafts; also Different Systems of Underground Haulage, with Horse-power required to do the Work; also on Strength of Hauling-rope and -chains.*

1. What do you consider the most easily applied and generally useful application of rope-haulage? Give your experience, and describe fully means of attaching the tubs to rope, also arrangement of tension.

2. Give sketch of a useful form of drum for use in lowering coal on self-acting inclines, feeding the main haulage-road.

3. On an incline having a grade of 1 in 5, and 40 chains long, it is required to lower 12 tubs in a race, the weight of coal being 6 tons, empties weighing 6 cwt. Give particulars of the drum you would erect, size of rope, and general arrangement of incline with passing-place.

---

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT IX.—*Tapping Water in Mines, and Mode of constructing Dams in Underground Workings to keep Water back.*

1. Being required to drive towards old workings known to contain a large body of water, what special precaution would you adopt in order to prevent accident? Give fully your reasons for the precautions you would adopt.

2. If required to fix dam to keep back water, what are the conditions which you would try to secure in the site where dam to be fixed? Sketch form of suitable dam to resist a head of 150 ft., and material used in its construction.

3. Suppose water to exist in old workings adjacent to mine in which you are engaged, what thickness of barrier would you leave and through which water could be run off?

SUBJECT X.—*Blasting, and the Use of Explosives.*

1. Give your experience of explosives other than powder, and detail their advantages or otherwise.

2. What are the objections to powder in fiery mines?

3. Have you experience of the system of water-cartridge in use in some mines?

4. What rules should be observed as regards shot-firing in mines giving off gas, in order to minimise accident?

---

**LIST OF MINING MANAGERS, BATTERY-SUPERINTENDENTS, AND ENGINE-DRIVERS WHO HAVE OBTAINED CERTIFICATES UNDER THE MINING AND COAL-MINES ACTS OF 1886, 1891, AND 1894.**

As there have been several inquiries made as to the names of persons who hold certificates as mine-managers and engine-drivers, the annexed is a complete list of those holding certificates at the date of this report, taken from the register:—

**THE MINING ACT.**

**FIRST-CLASS SERVICE CERTIFICATES.**

*Issued under "The Mining Act, 1886," without Examination.*

Adams, H. H., Waiorongomai.	Goldsworthy, J., Waiorongomai.	Newman, W., Naseby.
Anderson, P., Thames.	Greenish, J., Reefton.	Northey, J., Thames.
Andrews, T., Thames.	Greenville, W., Ohinemuri.	O'Sullivan, D. E., Thames.
Barclay, T. H., Thames.	Hansen, P. C., Thames.	Polton, A., Karangahake.
Bennett, J., Alexandra.	Harris, J., Owen's Reefs.	Porter, J., Waipori.
Benney, J., Coromandel.	Harrison, R. H., Coromandel.	Purvis, G., Ross.
Black, T., Waiomai.	Hilton, G. P., Bendigo.	Quinn, E., Te Aroha.
Bollersley, N., Boatman's.	Hodge, F., Coromandel.	Radford, T., Thames.
Bradbury, M., Reefton.	Hollis, W., Thames.	Ralph, J. G., Thames.
Bray, John, Lyell.	Hunter, R., Thames.	Ranger, J., Reefton.
Burch, W. H., Thames.	James, F., Thames.	Rasmussen, C. L., Mokihinui.
Byrne, J. F., Stafford.	Jamieson, A., Coromandel.	Rasmussen, C. P., Mokihinui.
Cameron, A., Macetown.	Jenkins, M., Wakatipu.	Reid, P., Coromandel.
Cameron, E., Te Aroha.	Johnstone, H., Bluespur.	Resta, L., Macetown.
Chapman, J. A., Dunedin.	Julian, J., Boatman's.	Roberts, E., Ross.
Clarke, G. S., Thames.	Kelly, J., Lyell.	Rooney, F., Reefton.
Comer, R., Thames.	Kerr, J., Thames.	Scott, T., Waiorongomai.
Conradson, M., Thames.	Lawn, E., Black's Point.	Searight, A., Reefton.
Cornes, C. A., Karangahake.	Lawn, H., Boatman's.	Senior, J., Thames.
Joutts, J., Thames.	Lawn, J., Reefton.	Smith, J. E., Thames.
Crawford, T. H., Thames.	Littlejohn, W., Karangahake.	Stone, F., Karangahake.
Crowley, C., Reefton.	Lowe, E. W., Thames.	Steedman, J. B., Thames.
Cummings, W., Reefton.	Malfroy, J. M. C., Ross.	Sturm, A., Waipori.
Davis, J. E., Queenstown.	Martin, W. G., Thames.	Taylor, N., Thames.
Davey, C., Ross.	McCullum, J., Reefton.	Todd, C., Heriot.
Donald, J., Cromwell.	McCullough, R., Thames.	Treloer, J. S., Reefton.
Dunlop, T. A., Thames.	McGruer, N., Karangahake.	Tripp, R. S., Arrowtown.
Edwards, J., Skipper's.	McIntosh, D., Bluespur.	Vivian, J. G., Thames.
Elliott, J., Macetown.	McKay, J., Ross.	Vivian, S., Reefton.
Evans, F., Skipper's.	McKenney, J., Reefton.	Walker, J. W., Thames.
Evans, J. H., Skipper's.	McKenzie, W., Thames.	Watson, T., Reefton.
Fitzmaurice, R., Reefton.	McLiver, H., Thames.	Wearne, J. E., Endeavour Inlet.
Frewen, J. B., Queenstown.	McMaster, J., Reefton.	Wilcox, J., Thames.
Gavin, T., Te Aroha.	Moore, H. W., Thames.	Williams, J., Skipper's.
Gilbert, J., Reefton.	Morgan, R., Otago.	Wright, G., Boatman's.
Gilmour, T., Thames.	Morrisby, A. A., Glenorchy.	Wylie, W., Ross.
Giles, G. F., West Wanganui.	Nasmyth, T., Reefton.	Young, G., Skipper's.
Glass, W. M., Naseby.		

*First-class Mine-managers' Certificates, issued after Examination, under "The Mining Act, 1886," and Amendment Acts.*

Adams, B., Thames.	Donaldson, W., Otago.	Kruizenza, W., Reefton.
Baker, W., Thames.	Fleming, M., Thames.	Lawn, T., Reefton.
Black, G., Reefton.	Gardner, W. P., Reefton.	Logan, H. F., Wellington.
Caples, P. Q., Reefton.	Harris, W., Thames.	Mangan, T., Thames.
Casley, G., Reefton.	Horn, G. W., Thames.	Mouat, W. G., Dunedin.
Cochrane, D. L., Reefton.	Horne, W., Coromandel.	Truscott, G., Thames.
Coombe, J., Reefton.	Hornick, M., Thames.	Watkins, C. E., Reefton.
Crawford, J. J., Thames.	Hosking, G. F., Auckland.	Wilkie, J., Reefton.
Cummings, W., Reefton.		

*First-class Mine-manager's Certificate, issued on Production of Certificate from a recognised Authority outside the Colony, under "The Mining Act, 1886," and "The Mining Act, 1891."*

Argall, W. H., Coromandel.	Goold, A. L., Auckland.	Hailey, R. C., Dunedin.
Beckwith, L. H., Wellington.	Griffiths, A. P., Auckland.	Williams, W. H., Auckland.
Datson, J., Maniaia.	Griffiths, H. P., Auckland.	

*First-class Mine-manager's Certificate, issued to Inspector of Mines by virtue of his Office, under "The Mining Act, 1886."*  
Binns, G. J., Dunedin.

*First-class Mine-managers' Certificates, issued after Examination, under "The Mining Act, 1891."*

Agnew, J. A., Thames.	James, T., Thames.	Paltridge, Henry, Thames.
Annear, William, Reefton.	Keane, P. E., Thames.	Prince, F. H., Reefton.
Bennett, E. P., Thames.	Lane, J., Reefton.	Robertson, D. B., Stafford.
Boydell, H. C., Coromandel.	Lawn, C. H., Caplestone.	Ross, Richard, Thames.
Bray, E., Thames.	Linck, F. W., Thames.	Shepherd, H. F., Thames.
Bruce, Malcolm, Thames.	Marshall, F., Reefton.	Stanford, W. J., Macetown.
Carroll, J., Lyell.	Morrison, R., Thames.	Steedman, J. G., Thames.
Cartwright, E., Thames.	McDermott, J., Thames.	Sutherland, Benjamin, Reefton.
Crabb, J., Reefton.	McDermott, G., Thames.	Tierney, R., Thames.
Dobson, J. A., Auckland.	McDermott, W., Thames.	Vialoux, F., Coromandel.
Evans, H. A., Wellington.	McGregor, W. T., Thames.	Warne, George, Thames.
Fahey, P., Reefton.	McKenzie, H. J., Coromandel.	White, G. H., Thames.
Flannigan, Francis, Reefton.	McPeake, J., Thames.	Whitley, A., Thames.
Gilmour, J. L., Thames.	O'Keefe, M. D., Thames.	Williams, C., Caplestone.
Hodge, J. H., Thames.	Paul, Matthew, Thames.	

*Second-class Mine-manager's Certificates, issued after Examination, under "The Mining Act, 1891."*

Christie, William, Waitekauri.	Evans, H. A., Skipper's.	McNeil, A. H., Coromandel.
Draffin, S., Waitekauri.	Gatland, V. Y., Coromandel.	White, G. H., Thames.
Dupkin, T., Coromandel.		

## SECOND-CLASS SERVICE CERTIFICATES AS MINE-MANAGERS.

*Issued under "The Mining Act, 1891."*

Adams, W. J., Thames.	Goldsworthy, William, Mauku, Auckland.	Moorecroft, Thomas, Thames.
Agnew, J. A., Coromandel.	Gemmings, Charles, Thames.	Milne, John, Thames.
Allen, Richard, Reefton.	Gribble, James, Norsewood.	Moyle, Thomas, Thames.
Argall, A. E., Coromandel.	Guthrie, John, Wellington.	Naysmith, James, Reefton.
Bennett, C. H., Coromandel.	Guy, Robert, Kuaotunu.	Newdick, Alfred, Thames.
Begley, Thomas, Reefton.	Harvey, William, Reefton.	Notman, Alexander, Reefton.
Beard, W. T., Reefton.	Hardman, James Edward, Thames.	O'Keefe, M. W. D., Thames.
Bone, William, Reefton.	Hetherington, William, Thames.	Page, John, Lyell.
Bowler, John, Thames.	Hill, Alex. Gray, Waikakaho.	Parkiss, Jos. W., Reefton.
Blair, Thomas, Kuaotunu.	Hore, John, Wellington.	Potts, W. H., Thames.
Bray, Edwin, Reefton.	Hollis, Fred. J., Waihi.	Primrose, J., Kuaotunu.
Brownlee, Thomas James, Thames.	Hornbrook, H. P., Kuaotunu.	Pettigrew, Robert, Sydney.
Brokenshire, James, Thames.	Jamieson, John, Reefton.	Peebles, Alexander, Kuaotunu.
Bolitho, James, Reefton.	Johnstone, William, Collingwood.	Pollock, John, Thames.
Brown, John, Macrae's.	Jobe, James, Thames.	Rabe, Henry, Thames.
Bremner, John, Coromandel.	Johns, Thomas, Thames.	Reid, Thomas Groat, Thames.
Borlase, J. H., Capleston.	Kendall, Henry, Thames.	Richard, John, Thames.
Bunny, Joseph, Thames.	Kerr, George, Kamo.	Richards, A. H., Kuaotunu.
Byrne, John, Karangahake.	Kirker, Thomas, Thames.	Radford, Thomas, Thames.
Caird, Alexander McNeil, Reefton.	Laughlin, David, Thames.	Rogers, Charles Henry, Reefton.
Campbell, J., Kuaotunu.	Law, John, Thames.	Rogers, William Henry, Kumara.
Climo, Noah, Coromandel.	Loughlin, S., Thames.	Ross, J., Thames.
Comer, George, Thames.	McLean, James, Thames.	Rowe, James, Thames.
Cowan, Hugh, Kuaotunu.	McLean, Alex., Coromandel.	Shaw, James, Karangahake.
Corbett, T., Paeroa.	McLean, Charles, Thames.	Sligo, Alex., Nenthorn.
Comer, W. W., Thames.	McCormick, Charles, Coromandel.	Thomas, James, Thames.
Crabb, Thomas, Reefton.	McQuillan, John, Reefton.	Thomas, A., Thames.
Daniel, P. F., Greymouth.	McNeill, Daniel, Thames.	Thomson, John, Dunedin.
Dobson, John Allen, Kuaotunu.	McNeill, George, Upper Kuaotunu.	Tregellas, James, Reefton.
Edwards, George, Westport.	McCombie, John, Karangahake.	Tregoweth, William, Thames.
Ellery, John, Reefton.	McEwen, James, Reefton.	Wells, Charles Lewis, Thames.
Flannigan, Francis, Reefton.	McLoghry, Archibald, Karangahake.	Willets, Henry, Thames.
Foster, Thomas, Wellington.	Mackay, William, Nenthorn.	Williams, James, Thames.
Gale, C. W., Coromandel.	Martin, James, Reefton.	Williams, John, Thames.
Gill, George, Thames.	Meagher, John, Karangahake.	Whisker, Charles, Thames.
Glasgow, T. M., Thames.	Mills, George, Thames.	White, John S., Karangahake.
Goldsworthy, Henry, Thames.	Mayn, John, Coromandel.	Wilson, James R. S., Kuaotunu.
Govan, Joseph, Thames.	Martin, David, Black's Point.	Wilson, J. G., Thames.
Griffin, Patrick, Thames.	Morgan, William, Upper Thames.	Woolcock, James, Thames.
Grimmond, Joseph, Ross.		Worth, Robert, Waihi.

## ENGINE-DRIVERS' SERVICE CERTIFICATES.

*Issued under "The Mining Act, 1891."*

Audley, F., Coromandel.	FitzMaurice, Raymond, Reefton.	Phillips, W. H., Thames.
Battens, H., Coromandel.	Grundy, T., Thames.	Ryan, J. P., Coromandel.
Black, C., Reefton.	Harrison, R. H., Kuaotunu.	Roche, H., Thames.
Black, G. J., Reefton.	Hope, J. S., Waitekauri.	Saunders, William, Reefton.
Bridson, Mat. J., Thames.	Hutton, George, Reefton.	Smith, R., Thames.
Casley, J., Thames.	Ivey, R., Thames.	Skilton, A. G., Westport.
Clerkin, F., Reefton.	Latimer, Alfred, Dunedin.	Sullivan, W., Coromandel.
Crabb, J., Reefton.	Lamberton, J., Reefton.	Titley, A. W., Black's Point.
Crofts, J. W., Skipper's.	Lawn, E., Reefton.	Walding, J., sen., Coromandel.
Cook, W., Thames.	McLean, J., Reefton.	Walding, J., jun., Coromandel.
Craig, D., Thames.	Milne, S., Coromandel.	Warne, G., Thames.
Davies, T., Thames.	Murphy, A. R., Queenstown.	Wishart, R., Thames.
Dunstan, J., Thames.	Morton, C., Thames.	Wood, A., Thames.
Faithful, William, sen., Cromwell.	Patterson, D., Reefton.	
Faithful, William, jun., Cromwell.	Patten, A. C., Reefton.	

*Engine-drivers' Certificates, issued after Examination, under "The Mining Act, 1891."*

Allen, A., Thames.	Dunstan, I., Waihi.	Ross, M., Reefton.
Auld, James, Reefton.	Elliston, A. J., Reefton.	Slowey, William, Reefton.
Blackadder, D., Reefton.	Lawn, C. H., Capleston.	Wilson, F. H., Thames.
Cook, S., Fairfield.	McAuley, T., Reefton (for water).	Wynn, M., jun., Reefton (for water).
Daldy, E. A., Coromandel.		

## THE COAL-MINES ACT.

## FIRST-CLASS MINE-MANAGERS' CERTIFICATES.

*Issued under the Coal-mines Acts, 1886 and 1891.*

Aitken, T., Wendon.	Irving, J., Kaitangata.	Redshaw, W., Whangarei.
Alexander, T., Brunnerton.	Jemison, W., Waimangaroa.	Reed, F., Westport.
Austin, J., Sheffield.	Kenyon, J., Shag Point.	Richardson, D., Abbotsford.
Bishop, J., Brunnerton.	Kerr, G., Kamo.	Shore, J., Kaitangata.
Brown, T., Westport.	Lindop, A. B., Springfield.	Shore, T., Orepuki.
Brown, T., Glentunnel.	Lindsay, W., Otago.	Shore, W. M., Kaitangata.
Cameron, J., Denniston.	Lloyd, J., Invercargill.	Smart, W., Christchurch.
Campbell, J. C., Fairfield.	Louden, J., Green Island.	Smith, A. E., Nelson.
Collins, W., Taupiri.	Love, A., Whangarei.	Smith, T. F., Nelson.
Dando, M., Brunnerton.	Mason, J., Nightcaps.	Sneddon, J., Mosgiel.
Elliot, R., Wallsend.	May, J., Greymouth.	Swinbanks, J., Kawakawa.
Ferguson, A., Whitecliffs.	Moody, T. P., Kawakawa.	Taylor, E. B., Huntly.
Freeman, J., Green Island.	Moore, W. J., Springfield.	Thompson, A., Whitecliffs.
Geary, J., Kamo.	Nelson, J., Green Island.	Walker, J., Collingwood.
Gray, J., Abbotsford.	Ord, J., Huntly.	Williams, W. H., Shag Point.
Harrison, J., Brunnerton.		

*Certificates issued after Examination under the Coal-mines Acts, 1886 and 1891.*

First-class.  
 Armitage, F. W., Auckland.  
 Armstrong, J., Brunnerton.  
 Barclay, T., Kaitangata.  
 Carson, W., Kaitangata.  
 Coulthard, J., Taylorville.  
 Dixon, W., jun., Kaitangata.  
 Dunn, W., Brunnerton.  
 Fleming, J., Kaitangata.  
 Gibson, John, Westport

First-class.  
 Gillanders, A., Shag Point.  
 Green, E. R., Abbotsford.  
 Green, J., Brunnerton.  
 Herd, J., Brunnerton.  
 Hosking, G. F., Auckland.  
 Jebson, D., Canterbury.  
 Leitch, J., Blackball.  
 McCormack, W., Denniston.  
 Milligan, N., Thames.

Murray, F., Westport.  
 Newsome, F., Denniston.  
 Tattley, E. W., Huntly.

Second-class.  
 Barclay, T., Kaitangata.  
 Dixon, W., jun., Kaitangata.  
 Harris, A., Saddle Hill.  
 Lindsay, J. B., Orepuki.  
 Snow, T., Mercer.

*Mine-managers' Certificates, issued on Production of English Certificate, under "The Coal-mines Act, 1886."*

Binns, G. J., Dunedin.  
 Black, T. H., Waipori.  
 Broome, G. H., Ngakawau.  
 Cater, T., Auckland.

Cochrane, N. D., Dunedin.  
 Garrett, J. H., Auckland.  
 Hayes, J., Kaitangata.  
 Hodgson, J. W., Ross.

Macalister, J., Invercargill.  
 Nimmo, J., Oamaru.  
 Straw, M., Westport.  
 Tattley, W., Auckland.

*First-class Mine-managers' Certificates, issued to Inspectors of Mines by virtue of Office, under the Mining Acts and the Coal-mines Acts.*

Cochrane, N. D., Westport.  
 Coutts, J., Wellington.

Gordon, H. A., Wellington.  
 Gow, J., Dunedin.

McLaren, J. M., Thames.  
 Wilson, G., Thames.

*Mine-managers' Certificates, issued on Production of English Certificate, under "The Coal-mines Act, 1891."*

Alison, R., Greymouth.  
 Frame, Joseph, Kaitangata.  
 Irvine, James, Dunedin.  
 Jordan, R. S., Kaitangata.

Lewis, W., Blackball.  
 Pollock, James, Green Island, Otago.  
 Proud, Joseph, Wanganui.

Scott, Joseph, Ngahere.  
 Tennent, R., Brunnerton.  
 Wright, E. S., Auckland.

## SECOND-CLASS MINE-MANAGERS' SERVICE CERTIFICATES.

*Issued under "The Coal-mines Act, 1891."*

Carson, M., Kaitangata.  
 Collier, Levi, Kamo.  
 Clarke, Edward, Shag Point.  
 Elliot, Joseph, Coal Creek.  
 Harris, John, Denniston.  
 Herd, Joseph, Brunnerton.  
 Howie, James, Kaitangata.  
 Leeming, William, Whitecliffs.

Lobb, Joseph, Mokau.  
 Love, Alexander, Orepuki.  
 McIntosh, Allan, Shag Point.  
 Marshall, J., Ngakawau.  
 Murray, Thomas, Denniston.  
 Nimmo, George Stewart, Ngapara.  
 Radcliffe, William, Reefton.  
 Roberts, John, Brunnerton.

Ross, John, Kawakawa.  
 Sara, James, Reefton.  
 Smith, Charles, Whangarei.  
 Thomas, James, Springfield.  
 Wallace, William, Huntly.  
 Willetts, John, Papakaio.  
 Willetts, John Morris, Papakaio.  
 Young, William, Waimangaroa.

## ENGINE-DRIVERS' CERTIFICATES.

*Issued under "The Coal-mines Act, 1886."*

Bainbridge, William, Brunnerton.  
 Beirn, William H., Kaitangata.  
 Clark, A., Kaitangata.  
 Davidson, Robert, Walton Park.  
 Elliott, R., Denniston.  
 Eltringham, Stephen, Greymouth.  
 Foote, Thomas, Miranda.  
 Gall, Adam, Huntly.  
 Gill, Robert, Shag Point.  
 Gillies, D., Walton Park.  
 Girven, Adam, Kawakawa.  
 Grundy, Walter, Kamo.  
 Gibson, J., Denniston.  
 Gray, G. A., Kaitangata.  
 Harrison, C. F. R., Huntly.  
 Hazeldene, T., Denniston.  
 Hartley, H., Huntly.

Henderson, J., Huntly.  
 Hetherington, R., Huntly.  
 Howie, William, Walton Park.  
 Kelly, Peter, Kaitangata.  
 Leisham, G., Denniston.  
 Marriott, T., Huntly.  
 Mason, J., Springfield.  
 Muir, T., Huntly.  
 Moore, Luke Martin, Brunnerton.  
 McFarlane, Henry, Miranda.  
 McGarry, James, Brunnerton.  
 McGregor, Duncan, Stirling.  
 McIntosh, Donald, Allandale.  
 McVie, John, Walton Park.  
 O'Neil, J., Denniston.  
 Porter, H. R., Huntly.  
 Ryan, T., Huntly.

Sampson, J., Huntly.  
 Saunders, J., Denniston.  
 Shore, Joseph, Kaitangata.  
 Skilton, F. G., Denniston.  
 Skellern, R., Huntly.  
 Smith, J., Denniston.  
 Southall, James, Brunnerton.  
 Thomas, William, Kamo.  
 Troughhear, Robert, Dobson.  
 Turner, Henry, Kawakawa.  
 Vincent, James, Miranda.  
 Wearn, Alfred, Boatman's.  
 Wearn, James, Wallsend.  
 Williams, Llewellyn, Kawakawa.  
 Woods, William, Kawakawa.  
 Williams, F. A., Shag Point.

## ENGINE-DRIVERS' SERVICE CERTIFICATES.

*Issued under "The Coal-mines Act, 1891."*

Archibald, W., Kaitangata.  
 Barlow, William John, Shag Point.  
 Boag, John, Shag Point.  
 Forrester, Robert, Kaitangata.  
 Girvan, R., Kawakawa.

Greening, Luke, Springfield.  
 Johnstone, R. N., Kaitangata.  
 McVie, Gavin, Kaitangata.  
 Milburn, Edward, Westport.  
 Park, John A., Huntly.

Prentice, J., Shag Point.  
 Rixon, William E., Shag Point.  
 Todd, William, Dunedin.  
 Webb, Peter Oliver, Nightcaps.

*Engine-drivers' Certificates, issued after Examination, under "The Coal-mines Act, 1891."*

Johnston, W. P., Kaitangata.  
 Marshall, D., Kaitangata.

Napier, A. T., Kaitangata.

Shearer, W., Huntly.

## BATTERY-SUPERINTENDENTS' CERTIFICATES.

*Issued under "The Mining Act 1891 Amendment Act, 1894," without undergoing Examination.*

Adams, H. H., Waihi.  
 Banks, Edwin Gripper, Waihi.  
 Barry, Hubert Percy, Waihi.  
 Goldsworthy, Henry, Kuaotunu.  
 Goldsworthy, John, Kuaotunu.  
 Greenway, H. Howard, Auckland.  
 Heard, G. St. Clair, Waihi.

Hope, John S., Waitekauri.  
 Hutchison, William, Karangahake.  
 Margetts, Frederick Ernest, Kuaotunu.  
 Merlett, Richard Sheridan, Waitekauri.  
 Napier, James, Karangahake.

Noble, James R., Karangahake.  
 Park, James, Thames.  
 Shepherd, Henry Franklin, Waihi.  
 Walker, James A., Kuaotunu.  
 Wilson, Arthur E., Waihi.  
 Wilson, James Kitchener, Auckland.

*Battery-superintendents' Certificates, issued after Examination, under "The Mining Act 1891 Amendment Act, 1894."*

Adams, A. A., Thames.  
 Allen, F. B., Thames.  
 Allom, H. O., Thames.  
 Ansley, Comyn, Paeroa.

Bowers, W., Thames.  
 McMicken, S. D., Thames.  
 McKenzie, H. J., Thames.  
 Morgan, P. G., Thames.

Morrin, W. S., Thames.  
 Robinson, J. R., Waitekauri.  
 Taylor, C. H., Tararu.  
 Thorpe, A. H., Thames.

## WINDING-ENGINE DRIVERS' CERTIFICATES OF COMPETENCY.

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894."

Aickin, Charles James.	Hunter, George.	Roach, Thomas Jenkin.
Allen, William John.	Jenkinson, Alfred.	Robertson, John.
Bainbridge, Henry.	Johnson, Thomas.	Roering, Franz.
Bentley, John Daniel.	Jones, Hugh Pughe.	Ryan, John Patrick.
Bickford, Charles Frederick.	Kay, John.	Sargent, Henry.
Bolitho, James.	Kelly, Peter George.	Saunders, William Henry.
Bowman, Charles Henry.	Lamb, Edward.	Schmetzer, Percy Carl.
Budge, George Symons.	Langford, Samuel George.	Scobbie, George.
Burgess, Benjamin.	Lawie, James.	Scott, Walter George.
Buxton, Harry Arthur.	Lennox, James Fisher.	Seawright, Robert E. E. M.
Bydder, Charles Alfred.	Letcher, John Henry.	Shortt, Edward.
Cathey, Alexander.	Lovatt, Charles Robert.	Sinclair, George.
Chamberlain, Charles.	Lyons, John.	Skelton, John.
Cheverton, George Henry.	Mackie, Edward Morrison.	Slater, William.
Christian, Herbert.	Maloney, James Joseph.	Smith, Walter.
Coad, Albert.	Martin, Thomas.	Snow, John George.
Colligan, John.	Mussicks, John Jackson.	Taylor, Alfred Edward.
Copeland, Joseph Barlow.	McAnulty, William.	Thwaites, William.
Cowie, Alexander.	McAuley, Thomas.	Tilla, Charles.
Cunningham, George.	McFarlane, Robert John.	Todd, James.
Dawson, William.	McIntosh, John.	Trembath, John.
Dodd, William.	McIntyre, James.	Turner, George Frederick.
Eustace, Charles Henry.	McLean, Arthur Charles.	Wearne, Jaketh Joseph.
Fraser, Theodore Tinne.	McLelland, James.	Welby, Amos Walter.
Greenway, George.	McMahan, Timothy.	Williams, Francis.
Harkins, William.	Norris, John William.	Williams, Reece.
Henry, Francis.	Parker, Daniel.	Wilson, Daniel.
Highet, John.	Provan, Andrew.	Wilson, John.
Hill, Benjamin.	Radford, Thomas.	Wray, John.
Hughes, William Henry.	Rayner, Alfred Edward.	Wylan, John.

## WINDING-ENGINE DRIVERS' SERVICE CERTIFICATES.

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894."

Boswell, James.	Elmore, William H.	McQuade, Richard C.
Broomfield, Charles Jones.	Ford, Arthur S.	Porch, John James.
Bruggy, Patrick M.	Griffin, Jonathan.	Robinson, John.
Buchan, George A.	Kennedy, Edward Thomas.	Sachirthal, Edward.
Burk, Thomas.	Leece, Henry S.	Soppet, Frederic W.
Cassidy, James.	Lindsay, Robert.	Thomson, James.
Clarke, George.	McCormick, John.	Walsh, Patrick.
Collier, Levi.	McKenzie, John.	White, Alexander.
Coutts, John.	McMillan, William.	Wilson, James William.
Cummock, John.		

## SUMMARY OF WORKS CONSTRUCTED.

The following statement shows the whole of the different classes of works constructed by the department, either by direct grants or by subsidies to local bodies, during the last sixteen years (the votes for this purpose having been under the control of the Hon. the Minister of Mines), for the purpose of opening up the mineral belts throughout the colony, and also for the development of the mining industry:—

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
UP TO YEARS 1882-83 AND 1883-84.	£ s. d.	£ s. d.	£ s. d.
Water-races .. .. .	29,252 1 11	14,853 9 5	14,398 11 6
Roads on goldfields .. .. .	21,437 11 2	13,089 16 0	8,347 15 2
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	52,841 17 0	21,844 16 7	10,207 15 9
Works undertaken by prospecting associations, subsidised by Mines Department .. .. .	13,216 18 4	3,350 0 0	3,400 0 0
Construction of drainage- and sludge-channels, subsidised by Mines Department .. .. .	5,750 0 0	2,468 15 4	781 4 8
	122,498 3 5	55,606 17 4	37,135 7 1
1884-85.			
Water-races .. .. .	4,846 1 9	14,596 2 9	4,648 11 6
Roads on goldfields .. .. .	13,667 10 1	9,630 9 6	12,384 15 9
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	13,566 14 1	6,293 16 6	12,739 17 6
Roads to mines, other than gold, subsidised by Mines Department .. .. .	4,594 10 0	111 19 0	2,888 1 0
Works undertaken by prospecting associations, subsidised by Mines Department .. .. .	650 0 0	108 0 0	3,692 0 0
Construction of drainage- and sludge-channels, subsidised by Mines Department .. .. .	4,050 0 0	1,050 0 0	1,931 4 8
Diamond and other drills .. .. .	3,600 0 0	1,858 0 0	..
	45,174 15 11	33,648 7 0	38,284 10 5
1885-86.			
Water-races .. .. .	3,660 4 9	6,063 2 3	6,964 4 4
Roads on goldfields .. .. .	27,543 18 8	12,360 14 9	27,567 19 8
Roads undertaken by County Councils, subsidised by Mines Department .. .. .	14,773 2 3	13,043 15 9	12,477 9 2
Roads to mines, other than gold, subsidised by Mines Department .. .. .	1,551 19 10	4,327 0 10	490 12 8
Works undertaken by prospecting associations, subsidised by Mines Department .. .. .	11,860 18 0	1,999 5 7	6,389 5 9
Construction of drainage- and sludge-channels, subsidised by Mines Department .. .. .	10,051 14 9	3,994 16 6	6,995 9 9
Schools of Mines .. .. .	2,160 9 7	1,260 9 7	900 0 0
	71,602 7 10	43,049 5 3	61,785 1 4

## SUMMARY OF WORKS CONSTRUCTED—continued.

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1886-87.	£ s. d.	£ s. d.	£ s. d.
Water-races .. .. .	12,453 3 5	1,928 14 4	3,466 0 8
Roads on goldfields .. .. .	12,613 4 8	22,229 16 1	17,791 7 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	12,613 4 8	7,415 19 6	10,455 1 5
Roads to mines, other than gold, subsidised by Mines Department .. .. .	..	806 1 0	110 13 1
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	15,671 19 6	4,521 7 3	4,618 4 7
Construction of drainage- and sludge-channels, subsidised by Mines Department .. .. .	5,549 14 6	6,207 18 0	672 6 10
Diamond and other drills .. .. .	422 15 6	422 15 6	..
Schools of Mines .. .. .	3,183 7 1	3,353 7 1	700 0 0
	49,894 4 8	46,415 18 9	37,813 13 7
1887-88.	£ s. d.	£ s. d.	£ s. d.
Water-races .. .. .	6 6 6	6 6 6	..
Roads on goldfields .. .. .	6,860 4 8	17,281 11 3	7,370 0 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	2,998 15 0	8,012 5 2	3,942 4 2
Roads to mines, other than gold, subsidised by Mines Department .. .. .	..	14 5 4	..
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	6,456 8 0	2,703 19 8	924 8 0
Construction of drainage- and sludge-channels, subsidised by Mines Department .. .. .	..	1,110 4 11	2,054 10 6
Schools of Mines .. .. .	1,859 3 7	2,221 19 4	837 4 3
Aids to treatment of ores .. .. .	1,200 0 0	890 18 8	209 1 9
	19,380 17 4	31,741 10 0	14,837 8 8
1888-89.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	10,253 5 3	4,304 3 9	18,218 11 6
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	7,318 1 0	2,466 16 8	5,195 6 1
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	474 0 0	236 0 0	687 8 0
Construction of drainage- and sludge-channels, subsidised by Mines Department .. .. .	..	54 10 6	..
Wharves, contributions by Mines Department .. .. .	589 19 5	96 6 0	343 13 5
Aids to treatment of ores, subsidised .. .. .	..	209 1 9	..
Schools of Mines .. .. .	895 16 10	1,188 6 10	44 14 3
	19,531 2 6	8,555 5 6	19,489 13 3
1889-90.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	8,834 9 7	9,148 5 9	8,005 5 4
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	8,507 15 8	3,451 17 11	5,928 1 3
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	..	..	663 0 0
Water-races .. .. .	2,200 0 0	719 0 0	681 0 0
Wharves .. .. .	..	150 0 0	193 13 5
Schools of Mines .. .. .	1,040 0 8	1,034 0 11	50 14 0
Aids to treatment of ores .. .. .	142 8 9	142 8 9	..
Tracks to open up mineral lands .. .. .	1,000 0 0	207 3 6	792 16 6
Diamond drills .. .. .	425 14 5	425 14 5	..
	17,150 9 1	15,278 11 3	16,314 10 6
1890-91.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	8,811 14 4	10,815 14 8	5,201 5 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	2,703 5 0	2,252 5 5	5,027 8 4
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	..	..	663 0 0
Water-races .. .. .	5,542 19 8	6,234 4 6	..
Wharves .. .. .	..	39 9 9	..
Schools of Mines .. .. .	3,847 10 0	3,898 4 0	..
Tracks to open up mineral lands .. .. .	..	78 4 7	419 19 5
	40,905 9 0	23,319 2 11	11,311 12 9
1891-92.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	14,226 5 1	8,460 0 3	11,767 9 10
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	3,162 0 0	1,720 18 6	4,937 10 2
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	1,455 5 5	336 15 9	1,663 0 0
Water-races .. .. .	2,256 13 6	2,256 13 6	..
Wharves .. .. .	..	..	..
Schools of Mines .. .. .	1,370 19 9	1,370 19 9	..
Tracks to open up mineral lands .. .. .	40 0 0	41 16 0	418 3 7
	22,511 3 9	14,187 3 9	18,786 3 7

## SUMMARY OF WORKS CONSTRUCTED—continued.

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1892-93.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	15,199 2 4	17,325 10 0	9,628 6 10
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	550 0 0	1,033 0 0	4,831 9 10
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	970 4 9	865 4 8	1,768 0 6
Water-races .. .. .	3,811 1 10	3,811 1 10	..
Wharves .. .. .	..	..	..
Schools of Mines .. .. .	1,232 4 4	1,232 4 4	..
Tracks to open up mineral lands .. .. .	..	..	419 19 5
Artesian-well boring, Maniototo Plains .. .. .	550 0 0	281 8 6	268 16 6
	22,312 13 3	24,548 8 11	16,916 3 1
1893-94.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	18,418 19 2	15,056 0 11	13,013 18 5
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	5,088 11 6	2,718 17 8	5,576 10 7
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	2,245 19 4	1,709 18 5	1,027 7 11
Water-races .. .. .	5,271 17 1	5,271 17 1	900 0 0
Drainage-channels .. .. .	..	..	1,000 0 0
Wharves .. .. .	..	..	..
Schools of Mines .. .. .	1,555 19 9	1,555 19 9	..
Tracks to open up mineral lands .. .. .	..	..	..
Repairing flood damages .. .. .	500 0 0	500 0 0	..
Artesian-well boring, Maniototo Plains .. .. .	800 0 0	518 16 6	..
	33,831 6 10	27,331 10 4	21,517 16 11
1894-95.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	20,908 13 7	15,160 8 5	18,752 10 7
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	685 18 4	2,295 9 2	1,984 5 7
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	10,805 15 4	2,378 18 2	3,006 13 0
Water-races .. .. .	4,801 19 7	2,427 10 11	2,151 18 8
Drainage-channels .. .. .	1,521 0 0	673 14 10	3,647 5 2
Wharves .. .. .	..	..	..
Schools of Mines .. .. .	999 8 6	999 8 6	..
Tracks to open up mineral lands .. .. .	..	..	..
Repairing flood damages .. .. .	..	..	..
Artesian-well boring, Maniototo Plains .. .. .	505 19 11	505 19 11	..
Diamond-drills .. .. .	..	..	..
	40,228 15 3	24,440 19 11	29,492 13 0
1895-96.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	14,554 0 7	19,970 6 6	14,086 4 8
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	4,614 11 1	1,607 8 6	4,290 16 11
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	3,477 7 0	1,726 4 8	10,093 8 0
Water-races .. .. .	6,820 18 3	5,162 9 2	2,515 7 9
Drainage-channels .. .. .	5,100 0 0	2,240 5 1	2,657 0 1
Wharves .. .. .	..	..	..
Schools of Mines .. .. .	999 8 0	999 8 0	..
Tracks to open up mineral lands .. .. .	..	..	..
Repairing flood damages .. .. .	..	..	..
Artesian-well boring, Maniototo Plains .. .. .	..	..	..
Diamond-drills .. .. .	216 1 6	216 1 6	..
	35,782 1 5	31,921 18 5	33,642 12 5
1896-97.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	57,685 9 6	30,720 12 7	35,622 15 3
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	11,677 0 0	1,759 6 5	4,079 18 3
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	1,570 7 3	1,533 6 7	2,915 14 8
Water-races .. .. .	3,090 11 1	3,927 18 0	1,678 0 10
Drainage-channels .. .. .	1,409 0 0	2,149 3 11	2,516 16 2
Wharves .. .. .	..	..	..
Schools of Mines .. .. .	1,682 19 5	1,682 19 5	..
Tracks to open up mineral lands .. .. .	..	..	..
Repairing flood damage .. .. .	..	..	..
Artesian-well boring, Maniototo Plains .. .. .	..	..	..
Resumption of land .. .. .	300 0 0	300 0 0	..
Prospecting deep levels .. .. .	25,500 0 0	2,697 14 5	22,802 5 7
	102,915 7 3	44,771 1 4	69,615 10 4



SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress
1897-98.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields .. .. .	71,818 11 7	37,410 14 8	88,907 17 4
Roads and tracks undertaken by County Councils, subsidised by Mines Department .. .. .	25,151 9 8	12,158 6 7	9,677 14 0
Works undertaken by prospecting associations and companies, subsidised by Mines Department .. .. .	8,939 8 1	2,357 15 1	1,581 13 0
Water-races .. .. .	8,275 8 9	2,272 5 0	1,003 3 9
Drainage-channels .. .. .	4,481 14 0	1,212 14 9	3,268 19 3
Schools of Mines .. .. .	1,780 17 8	1,780 17 8	..
Prospecting deep levels .. .. .	25,500 0 0	21,520 15 0	1,281 10 7
Water-conservation .. .. .	507 8 9	507 8 9	..
Construction of telephone-lines .. .. .	60 0 0	50 0 0	..
Compensation proclamation of rivers .. .. .	5,196 13 10	5,196 13 10	..
	141,211 6 11	84,467 5 6	50,720 17 11
SUMMARY.			
Roads on goldfields .. .. .	817,172 18 7	242,963 19 8	38,907 17 4
Subsidised roads and tracks .. .. .	166,202 5 8	88,075 0 4	9,677 14 0
Subsidised roads and tracks other than on goldfields .. .. .	6,146 9 10	4,759 6 2	..
Prospecting .. .. .	71,045 10 0	23,827 10 8	1,581 13 0
Water-races .. .. .	74,836 4 8	69,530 15 3	1,003 3 9
Wharves .. .. .	435 15 9	285 15 9	..
Schools of Mines .. .. .	22,607 19 9	22,607 19 9	..
Drainage-channels .. .. .	83,913 3 8	21,161 3 10	3,268 19 3
Diamond-drills .. .. .	5,170 11 4	3,428 11 4	..
Treatment of ores .. .. .	1,342 8 9	742 8 9	..
Tracks to open up mineral lands .. .. .	325 8 1	325 8 1	..
Artesian-well boring, Maniototo Plains .. .. .	800 0 0	800 0 0	..
Repairing flood damages .. .. .	500 0 0	500 0 0	..
Prospecting deep levels .. .. .	25,500 0 0	24,218 9 5	1,281 10 7
Resumption of land .. .. .	300 0 0	300 0 0	..
Water-conservation .. .. .	507 8 9	507 8 9	..
Construction of telephone-lines .. .. .	60 0 0	50 0 0	..
Proclamation of rivers .. .. .	5,196 13 10	5,196 13 10	..
	732,063 12 10	509,280 6 7	50,720 17 11

It will be seen from the foregoing statement that works to the value of £141,211 were authorised during the past year, as against £102,915 for the previous year, whilst the expenditure during the period referred to was £84,467, as against £44,771 for the year previous, leaving the liabilities on works authorised and in progress on the 31st March last to be £50,721. The actual cost of works undertaken, completed, and in progress during the last sixteen years that votes for this purpose have been under the direct control of the Mines Department for the development of the goldfields, has been £732,063, out of which the Government has expended £509,280 in subsidies to local bodies and direct grants for the construction of the different works, whilst £222,783 has been contributed by local bodies and prospecting associations.

The widely separated places in which prospecting was carried on, and where discoveries of gold were made, rendered the increased expenditure on new roads and tracks necessary, and the department, in view of the continued extension of these discoveries, had good warrant for undertaking the works. There is still urgent need for further roads and tracks to give access to localities where mining operations are carried on, and to which it is at present almost impossible to convey supplies and machinery at anything except prohibitive rates.

The quartz reefs, both in the North and South Island, are generally to be found in mountainous and rough country.

The vast alluvial deposits in the South Island, which are so widely distributed, extending as they do from sea-level to altitudes of 4,000 ft., are not by any means yet fully explored, and it is evident that means of approach to some of these is necessary in order to permit of a further development of their mineral wealth.

The introduction of capital and the extensive works undertaken during the past two years have not so far had the effect of increasing the gold returns; indeed, the contrary has been the case, the returns of gold exported being less for 1897-98 than those for 1896-97. Notwithstanding the shrinkage in the yield of gold for this year it is expected that the new machinery for ore-treatment and the introduction of further water-supplies for alluvial mining will, by increasing the quantity of material operated on, cause an increased output next year. The addition to the number of dredges will also enable larger quantities of the gravels in river-beds and other deposits to be dealt with.

It is satisfactory to note that the efforts of the highly qualified mining engineers and managers in charge of some of the best-known and valuable mines in the colony, and whose intelligent development operations have been carefully watched, are having a beneficial effect on the stability of the industry; and it is anticipated that, though more caution may be exercised by investors, it will always be possible to obtain ample capital to develop legitimate mining undertakings under the conduct of men of high integrity and practical experience.

Although it has not been my good fortune to report a more satisfactory yield of gold for the past year, it is gratifying to be able to say that improved methods of working, gold-saving, and extraction give indications that an increased yield will be recorded in the future.

I have, &c.,

GEO. WILSON,

Inspecting Engineer.

LIST of WORKS on GOLDFIELDS undertaken wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, in Progress on the 31st March, 1898.

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
<b>NORTH ISLAND.</b>			
<b>ROADS (SUBSIDISED).</b>			
<i>Coromandel County.</i>			
Bridge across Warekaho Creek .. ..	£ s. d. 300 0 0	£ s. d. 100 0 0	£ s. d. 50 0 0
Cabbage Bay to Mines .. ..	400 0 0	100 0 0	100 0 0
Two bridges and approaches, Kuaotunu Main Road ..	300 0 0	100 0 0	50 0 0
Widening Waitaia Battery Road .. ..	200 0 0	50 0 0	50 0 0
Road from Success Road to workings of Karaka Block Com- pany .. ..	200 0 0	..	100 0 0
Tiki to Opitonui .. ..	500 0 0	..	250 0 0
	1,900 0 0	350 0 0	600 0 0
<i>Thames County.</i>			
Karaka Creek Road .. ..	150 0 0	68 4 6	6 15 6
Te Papa Gully Road .. ..	100 0 0	..	50 0 0
Omahu to Tairua .. ..	50 0 0	42 0 0	8 0 0
Repairs, Waiotahi and Moanatairi Aqueducts .. ..	500 0 0	..	252 0 0
Townsend's Road .. ..	150 0 0	..	150 0 0
	950 0 0	110 4 6	466 15 6
<i>Thames Borough.</i>			
Widening, &c., Karaka Creek .. ..	300 0 0	..	150 0 0
Metalling roads .. ..	876 0 0	..	438 0 0
	1,176 0 0	..	588 0 0
<i>Ohinemuri County.</i>			
Drain along Mill Road, Paeroa .. ..	200 0 0	90 2 5	32 7 7
Road running south on left bank of Waihou River ..	600 0 0	117 15 0	282 5 0
Drain from railway-line to Waihou River .. ..	137 10 0	..	68 15 0
Road from Paeroa Bridge to Kuaotini Bridge .. ..	400 0 0	31 15 4	101 11 4
Road adjoining Te Iringa-o-Pirori Blocks .. ..	286 0 0	8 15 3	134 4 9
Low-level tunnel, Jubilee Mine (E. Kersey Cooper) ..	1,500 0 0	103 16 0	646 4 0
Kaimanawa Road .. ..	200 0 0	..	100 0 0
Karangahake Bridge .. ..	1,032 0 0	107 8 1	407 16 11
	4,955 10 0	459 7 1	1,773 4 7
<i>Te Aroha Town Board.</i>			
Repairs, flood-damages .. ..	150 0 0	43 15 0	31 5 0
<i>Katikati Road Board.</i>			
Katikati-Karangahake Track .. ..	200 0 0	100 0 0	100 0 0
<i>Piako County.</i>			
Waiorongomai Tramway .. ..	250 0 0	..	125 0 0
<b>MIDDLE ISLAND.</b>			
<b>ROADS (SUBSIDISED).</b>			
<i>Picton Road Board.</i>			
Repairs, Kaituna-Tuamarina Road .. ..	100 0 0	..	50 0 0
<i>Pelorus Road Board.</i>			
Widening road to Golden Bar Mine .. ..	50 0 0	..	30 0 0
<i>Collingwood County.</i>			
Aorere Bridge .. ..	200 0 0	..	100 0 0
<i>Buller County.</i>			
Road to Britannia Company's Mine, Stoney Creek ..	400 0 0	..	200 0 0
Lyell Creek to Gibbstown .. ..	200 0 0	66 13 4	33 6 8
Road, Stoney Creek-Waimangaroa .. ..	400 0 0	..	200 0 0
Road, Costello's Hill-Charleston (alteration) .. ..	600 0 0	..	300 0 0
Dee Creek Company's Claim .. ..	350 0 0	..	175 0 0
	1,950 0 0	66 13 4	908 6 8
<i>Inangahua County.</i>			
Widening track from Scotia Tunnel, on Big River Road, to Inkermann Mine .. ..	200 0 0	80 9 0	19 11 0
<i>Grey County.</i>			
Maraden-Dunganville Road .. ..	100 0 0	..	50 0 0
Ten-mile Creek Bridge .. ..	400 0 0	150 0 0	170 0 0
Deviation Moonlight Track .. ..	100 0 0	25 0 0	25 0 0
Track to Croesus battery-site, Paparoa .. ..	200 0 0	50 0 0	50 0 0
Road, Seventeen-mile Bluff to Barrytown Gold-mining Com- pany .. ..	100 0 0	..	40 0 0
Blackball to Paparoa .. ..	1,386 0 0	700 0 0	586 10 0
Abaura Bridge .. ..	2,250 0 0	1,400 0 0	1,050 0 0
	4,536 0 0	2,325 0 0	1,971 10 0
<i>Westland County.</i>			
Improving road, Seven-mile, Taipo .. ..	150 0 0	17 8 0	57 12 0

## LIST of WORKS on GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
<i>Tuapeka County.</i>			
Metalling road, Lawrence to Waipori .. ..	£ s. d. 550 0 0	£ s. d. 291 3 6	£ s. d. 58 16 6
Shelter-sheds and snow-poles .. ..	100 0 0	..	50 0 0
Miller's Flat Bridge .. ..	11,242 0 0	5,398 7 8	1,222 12 9
	11,892 0 0	5,689 10 9	1,331 9 3
<i>Lake County.</i>			
Skipper's Bridge .. ..	4,244 0 0	500 0 0	1,000 0 0
<i>Southland County.</i>			
Dray-road to Ferry Terrace, Nokomai .. ..	100 0 0	..	50 0 0
Repairs to roads and tracks .. ..	500 0 0	..	400 0 0
	600 0 0	..	450 0 0
WORKS CONSTRUCTED WHOLLY BY MINES DEPARTMENT.			
Puriri to Tairua .. ..	836 6 3	546 16 10	289 9 5
Kauaeranga Valley Road .. ..	276 10 0	..	276 10 0
Waiomo to Monowai .. ..	31 6 0	..	31 6 0
Waitahi Village Settlement .. ..	12 1 6	..	12 1 6
Tapu Creek extension .. ..	806 1 11	606 1 11	200 0 0
Thames to Waikawau .. ..	1,735 11 7	1,350 11 7	385 0 0
Thames to Hikutaia .. ..	1,432 0 0	1,205 0 2	226 19 10
Puru Creek Road .. ..	400 0 0	300 0 0	100 0 0
Turua to Netherton .. ..	650 0 0	350 0 0	300 0 0
Hikutaia-Whangamata "Wires" Track .. ..	1,040 0 0	671 11 5	368 8 7
Upper Tararu Road .. ..	490 9 9	304 6 8	186 8 1
Matatoki Road .. ..	260 0 0	138 14 2	121 5 10
Wharepoa Settlement Road .. ..	623 7 5	504 2 5	119 5 0
Omahu to Whangamata .. ..	700 0 0	106 4 0	598 16 0
Drains, Hikutaia .. ..	150 0 0	..	150 0 0
Whakapara-Puhipuhi .. ..	350 0 0	250 0 0	100 0 0
Kiripaka to coal-mines .. ..	100 0 0	..	100 0 0
Tairua-Whenuakite .. ..	300 0 0	250 0 0	50 0 0
Tiki to Kaimarama .. ..	300 0 0	250 0 0	50 0 0
Mercury Bay to Whenuakite and Boat Harbour .. ..	200 0 0	150 0 0	50 0 0
Netherton Road .. ..	75 0 0	28 14 6	46 5 6
Whangamata Road .. ..	75 0 0	..	75 0 0
Hikutaia to Waihi .. ..	2,315 0 0	1,815 0 0	500 0 0
Paeroa to Waitoa .. ..	705 13 4	205 13 4	500 0 0
Road-formation, Waitekauri to Cross Road .. ..	300 0 0	271 11 11	28 8 1
Waihi to Whangamata .. ..	500 0 0	300 0 0	200 0 0
Paeroa to Te Aroha .. ..	400 0 0	300 0 0	100 0 0
Whangamata to Wharekiraupunga .. ..	250 0 0	..	250 0 0
Waitekauri to Wharekiraupunga .. ..	250 0 0	..	250 0 0
Hikutaia to Waitekauri .. ..	200 0 0	..	200 0 0
Komata Reefs to Paeroa .. ..	300 0 0	..	300 0 0
Komata Reefs to Waitekauri .. ..	200 0 0	..	200 0 0
Repairing flood-damages, Matamata .. ..	100 0 0	..	100 0 0
Roads, Katikati and Tauranga .. ..	1,260 0 0	530 0 0	730 0 0
Bartlett's Creek Track .. ..	350 0 0	183 10 4	166 9 8
Clearing Oullensville-Waikakaho Track .. ..	25 0 0	..	25 0 0
Foot-bridges, Dead Horse and Walker's Creeks .. ..	25 0 0	..	25 0 0
Gravelling road through Mr. Adams's property .. ..	100 0 0	94 9 0	5 11 0
Gravelling Onamalutu Track .. ..	100 0 0	98 17 0	1 3 0
Rocky Ferry to Kaituna .. ..	500 0 0	..	500 0 0
Tracks, Wakamarina and Mahakipawa .. ..	100 0 0	23 16 6	76 3 6
Re-metalling Wakamarina Road .. ..	500 0 0	468 5 0	31 15 0
Onamalutu-Wakamarina Track .. ..	539 0 0	400 0 0	139 0 0
Havelock-Tuamarina Road .. ..	400 0 0	294 8 9	105 16 3
Richmond to Collingwood .. ..	500 0 0	250 0 0	250 0 0
Bonny Doon Road .. ..	600 0 0	500 0 0	100 0 0
Collingwood to Parapara .. ..	800 0 0	500 0 0	300 0 0
Anatoki Track .. ..	150 0 0	..	150 0 0
Takaka River Foot-bridge .. ..	150 0 0	..	150 0 0
Scott's Creek Bridge .. ..	100 0 0	..	100 0 0
Pakawau Bush Road .. ..	425 0 0	200 0 0	225 0 0
Inland Road, Parapara to Takaka .. ..	500 0 0	..	500 0 0
Mud-flat, portion of Takaka-Collingwood Inland Road .. ..	200 0 0	..	200 0 0
Karama Track .. ..	250 0 0	..	250 0 0
Road to Fenian Creek, Karama .. ..	250 0 0	..	250 0 0
Road from Westport and Mokihinui Railway-line to Jones's Creek .. ..	100 0 0	..	100 0 0
Road from Seddonville to Mokihinui .. ..	770 0 0	570 0 0	200 0 0
Track, Seddonville to Mokihinui Mine .. ..	100 0 0	..	100 0 0
Granity Creek southwards .. ..	200 0 0	..	200 0 0
Deadman's Creek to Christmas Terrace .. ..	250 0 0	150 0 0	100 0 0
Wilson's Lead Road .. ..	300 0 0	150 0 0	150 0 0
Millerton Road .. ..	300 0 0	200 0 0	100 0 0
Lyell Bridge to Ryan's .. ..	250 0 0	100 0 0	150 0 0
Track up Four-mile and Nile Rivers .. ..	400 0 0	250 0 0	150 0 0
Big Totara River Bridge .. ..	450 0 0	..	450 0 0
Little Totara River Bridge .. ..	350 0 0	..	350 0 0
Denniston to Cascade Creek .. ..	100 0 0	..	100 0 0
Bradshaw's Lead Road .. ..	100 0 0	..	100 0 0
Road, Oparara River, Karama .. ..	200 0 0	..	200 0 0
Road, Westport-Mokihinui .. ..	500 0 0	..	500 0 0

## LIST OF WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
<b>WORKS CONSTRUCTED BY MINES DEPARTMENT—continued.</b>	<b>£ s. d.</b>	<b>£ s. d.</b>	<b>£ s. d.</b>
Mokihinui to Reefs (widening) .. .. .	250 0 0	..	250 0 0
Denniston Hill Road .. .. .	500 0 0	..	500 0 0
Eight-mile Lyell to Mokihinui .. .. .	250 0 0	..	250 0 0
Mokihinui to Wanganui (improving) .. .. .	250 0 0	..	250 0 0
Addison's Road to Buller Road .. .. .	250 0 0	..	250 0 0
Track to Piper's Flat, Addison's .. .. .	225 0 0	150 0 0	75 0 0
Reefton-Marua .. .. .	1,185 8 6	879 18 0	305 10 6
Marua Road and horse-track <i>via</i> Casiani's .. .. .	200 0 0	158 0 0	42 0 0
Hampden to Horse Terrace .. .. .	3,484 0 0	3,450 18 6	33 1 6
Snowy Creek to reefs .. .. .	250 0 0	..	250 0 0
Murray Creek to Painkiller .. .. .	678 4 0	474 0 0	204 4 0
Lyell to Victoria Range .. .. .	300 0 0	100 0 0	200 0 0
Track to Adamstown .. .. .	450 4 0	375 4 0	75 0 0
Road, Hampden Cemetery to Schoolhouse, Murchison .. .. .	300 0 0	..	300 0 0
Little Grey River Bridge .. .. .	400 0 0	..	400 0 0
Culverts, Devil's Creek .. .. .	100 0 0	..	100 0 0
Dray-road, Capleston to Larry's .. .. .	300 0 0	..	300 0 0
Glenroy to Marua Plains .. .. .	250 0 0	..	250 0 0
No Town to Big Bill's (widening) .. .. .	20 0 0	..	20 0 0
Footbridge, No Town Creek .. .. .	30 0 0	..	30 0 0
Wood's Creek Bridge .. .. .	80 0 0	..	80 0 0
Maori Creek Bridge .. .. .	50 0 0	..	50 0 0
Grey River to Moonlight .. .. .	400 0 0	350 0 0	50 0 0
Moonlight to Paparoa .. .. .	100 0 0	75 0 0	25 0 0
Footbridges, Cobden-Seven-mile Road .. .. .	325 0 0	275 0 0	50 0 0
Track, Fagan's Creek, near Barrytown, to Paparoa Ranges .. .. .	425 0 0	300 0 0	125 0 0
Waipuna Road .. .. .	200 0 0	100 0 0	100 0 0
Paroa-Teremakau .. .. .	425 0 0	225 0 0	200 0 0
Brunnerton to Paparoa .. .. .	200 0 0	50 0 0	150 0 0
Bridges, Raleigh's Creek (three) .. .. .	300 0 0	..	300 0 0
Nelson Creek Bridge .. .. .	600 0 0	..	600 0 0
Callaghan's Creek Bridge .. .. .	200 0 0	..	200 0 0
Brandy Jack's Creek Bridge .. .. .	100 0 0	..	100 0 0
Track up Ten-mile Creek .. .. .	100 0 0	..	100 0 0
Repairs, Cobden-Barrytown Road .. .. .	800 0 0	..	800 0 0
Road, Cobden to Warren's Accommodation-house and Ten-mile Bluff to Barrytown .. .. .	200 0 0	..	200 0 0
Cape Terrace Road continuation .. .. .	150 0 0	..	150 0 0
Mosquito-Maori Creek Track .. .. .	100 0 0	..	100 0 0
Lake Brunner Road towards Maori Creek .. .. .	150 0 0	..	150 0 0
Bridge over Kanieri River .. .. .	125 0 0	94 5 0	39 15 0
Main South Road to Mikonui Beach .. .. .	100 0 0	84 15 0	15 5 0
Track, Waikupakupa, Ocean Beach to main road .. .. .	100 0 0	84 8 0	15 12 0
Totara River to Constitution Hill .. .. .	140 0 0	123 1 0	16 19 0
Waiho River Bridge .. .. .	150 0 0	..	150 0 0
Deviation, Larrikin's Road .. .. .	1,494 16 5	1,375 4 2	119 12 3
Renewal, Fisherman's Creek Bridge .. .. .	100 0 0	..	100 0 0
Doughboy Road .. .. .	300 0 0	..	300 0 0
Totara River to Farmer's Creek .. .. .	200 0 0	150 3 0	49 17 0
Widening and repairing Lamplough Track .. .. .	150 0 0	95 15 0	54 5 0
Extension Gillam's Gully Road .. .. .	100 0 0	87 0 0	38 0 0
Track and wire bridge, Upper Calary .. .. .	200 0 0	..	200 0 0
Teremakau-Paroa .. .. .	250 0 0	..	250 0 0
Mahinapua and South Terrace Track .. .. .	250 0 0	..	250 0 0
Adair's Track, Mahinapua Road .. .. .	150 0 0	..	150 0 0
Seven-mile Creek, Taipo .. .. .	350 0 0	..	350 0 0
Veronica Creek Track .. .. .	200 0 0	..	200 0 0
Repairing bridge, Donnelly's Creek .. .. .	150 0 0	..	150 0 0
Punt, Hawea and Wanaka districts .. .. .	300 0 0	..	300 0 0
Clyde-Queenstown .. .. .	750 0 0	250 0 0	500 0 0
Track up Shotover River .. .. .	200 0 0	50 0 0	150 0 0
Arrowtown to Macetown .. .. .	1,150 0 0	900 0 0	250 0 0
Lawrence-Clyde .. .. .	2,000 0 0	1,500 0 0	500 0 0
Lawrence-Waipori .. .. .	750 0 0	377 0 9	372 19 3
Roxburgh-Clyde .. .. .	500 0 0	..	500 0 0
Waitahuna to Bruce County boundary .. .. .	150 0 0	..	150 0 0
Bridge at Waipori .. .. .	400 0 0	..	400 0 0
Orepuki, Block I., Longwood .. .. .	500 0 0	250 0 0	250 0 0
Waipori-Berwick Gorge Road .. .. .	1,976 18 9	1,476 18 9	500 0 0
Reefton-Hokitika-Ross .. .. .	5,850 0 0	4,890 13 5	959 6 7
Okuru River Ford Track .. .. .	291 0 0	194 19 11	96 0 1
Kokatahi Road .. .. .	506 6 6	451 2 5	55 4 1
Karangarua Bridge .. .. .	450 0 0	4 13 0	445 7 0
Pine-tree Road .. .. .	75 0 0	45 10 7	29 9 5
Widening Cook's River Flat Road .. .. .	400 0 0	366 11 6	38 8 6
Wire bridge, German Gully Track .. .. .	120 0 0	89 0 6	30 19 6
Waiau to Preservation Inlet .. .. .	1,600 0 0	1,397 5 0	202 15 0
Walker's Creek Bridge .. .. .	250 0 0	..	250 0 0
Landing Creek Bridge .. .. .	500 0 0	..	500 0 0
Improving Ford, Granity Creek .. .. .	300 0 0	..	300 0 0
Dee Creek Bridge .. .. .	300 0 0	..	300 0 0
Mangle's Bridge .. .. .	1,000 0 0	248 0 8	751 19 4
Wangapeka-Wanganui .. .. .	1,750 0 2	1,459 14 3	290 5 11
Belgrove-Westport-Reefton .. .. .	5,750 0 0	5,464 1 8	285 18 4
Picton-Grove .. .. .	700 0 0	165 6 3	534 13 9
Table-land Horse-track .. .. .	200 0 0	177 15 5	2 4 7

LIST OF WORKS ON GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
<b>WORKS CONSTRUCTED BY MINES DEPARTMENT—<i>continued.</i></b>	<b>£ s. d.</b>	<b>£ s. d.</b>	<b>£ s. d.</b>
Bell Hill Road .. .. .	200 0 0	..	200 0 0
Greenstone-Teremakau .. .. .	200 0 0	118 12 6	81 7 6
Roads, Preservation Inlet .. .. .	300 0 0	..	300 0 0
Tracks, Cromarty .. .. .	200 0 0	..	200 0 0
Clifden Bridge, Waiau River .. .. .	500 0 0	..	500 0 0
	77,764 16 1	43,781 18 9	33,982 17 4
<b>SCHOOLS OF MINES.</b>			
Schools of Mines .. .. .	15,857 19 9	15,857 19 9	..
Schools of Mines (Otago University) .. .. .	6,750 0 0	6,750 0 0	..
	22,607 19 9	22,607 19 9	..
<b>PROSPECTING SUBSIDIES.</b>			
Kapanga Gold-mining Company (Limited) .. .. .	20,600 0 0	1,735 8 11	183 11 11
Kuaotunu Prospecting Association .. .. .	48 10 0	26 0 0	22 4 0
Coromandel County Council .. .. .	200 0 0	50 0 0	50 0 0
Te Aroha Town Board .. .. .	100 0 0	37 17 6	12 2 6
Katikati Prospecting Association .. .. .	52 0 0	20 0 0	6 0 0
New Bay of Islands Coal Company .. .. .	200 0 0	89 17 0	110 3 0
Bombay Prospecting Association .. .. .	40 0 0	16 7 9	8 12 3
Paparata Road Board (Parker and Piggott) .. .. .	65 0 0	22 0 0	10 10 0
Hororata Prospecting Association .. .. .	70 0 0	17 5 0	17 15 0
Charleston Miners' Association .. .. .	110 0 0	39 8 6	21 11 6
Buller County, Fairdown Tunnel .. .. .	150 0 0	..	150 0 0
Buller County (Reaney and Rasmussen) .. .. .	120 0 0	30 0 0	30 0 0
Buller County (Samuel and party) .. .. .	100 0 0	5 11 0	94 9 0
Buller County (Berry and party) .. .. .	26 0 0	..	13 0 0
Gold-mining League, Westport, Beaconsfield Tunnel .. .. .	15 0 0	..	7 10 0
Gold-mining League, Westport (McFarlane and others) .. .. .	39 0 0	13 10 0	6 0 0
Westport Miners' Association, Rough and Tumble Creek .. .. .	30 0 0	..	15 0 0
Prospecting tunnel, Boatmans (Cornwall, Walker, and party) .. .. .	302 10 0	40 4 3	114 15 9
Inangahua County (Gabriel and party) .. .. .	100 0 0	11 11 0	38 9 0
Miners' Association, Nelson Creek (McGowan and party) .. .. .	160 0 0	..	80 0 0
Drainage-tunnel, Dunedin Flat (£ for £) .. .. .	2,375 0 0	1,087 10 4	100 0 0
Westland County, prospecting, Rimu (£ for £) .. .. .	2,617 2 4	1,306 11 2	..
Westland County, prospecting, Kanieri .. .. .	489 7 0	244 13 6	..
Westland County, prospecting (Holmes and party) .. .. .	200 0 0	..	100 0 0
Westland County, prospecting (Dwyer and party, Blue Spur) .. .. .	400 0 0	167 4 0	32 16 0
Westland County (N. Johnston, Fox's Flat) .. .. .	140 0 0	53 19 2	17 9 10
Miners' Association, Ross (Marchesi and Foletti) .. .. .	98 0 0	45 0 0	1 5 0
Miners' Association, Ross (McKay and Brown) .. .. .	26 0 0	13 0 0	13 0 0
Miners' Association, Ross, Park Terrace Tunnel .. .. .	57 10 0	..	28 15 0
Miners' Association, Ross (McEwen and McKechnie) .. .. .	13 0 0	..	13 0 0
Miners' Association, Greenstone (Crawford and party) .. .. .	97 10 0	33 0 0	64 10 0
Miners' Association, Greenstone (Dickson and party) .. .. .	72 0 0	..	36 0 0
Miners' Association, Dillmanstown (Black and party) .. .. .	31 10 0	12 0 0	10 10 0
Tapanui Prospecting Association .. .. .	40 0 0	18 10 0	11 10 0
Tuapeka County, Gabriel's Gully Reef Prospecting Association .. .. .	400 0 0	106 14 0	93 6 0
Hyde Miners' Association .. .. .	20 0 0	..	20 0 0
Longwood Sluicing Company, Riverton .. .. .	30 0 0	142 10 0	7 10 0
Miners' Association, Lowburn (Tilliman and party) .. .. .	57 10 0	42 9 9	15 0 3
Miners' Association, Glenorchy .. .. .	13 0 0	..	13 0 0
Miners' Association, Upper Waikata .. .. .	19 10 0	13 0 0	6 10 0
Miners' Association, Riverton .. .. .	18 0 0	7 3 0	10 17 0
	29,738 19 4	5,444 0 10	1,581 13 0
<b>PROSPECTING DEEP LEVELS.</b>			
Thames-Hauraki Goldfields (Limited), Queen of Beauty shaft .. .. .	25,000 0 0	23,864 6 1	1,135 13 11
Thames-Hauraki Goldfields (Limited), Queen of Beauty shaft, inspector's fee .. .. .	500 0 0	354 3 4	145 16 8
	25,500 0 0	24,218 9 5	1,281 10 7
<b>WATER-RACES.</b>			
Waimea-Kumara Water-race .. .. .	32,624 19 1	32,036 6 8	588 12 5
Mount Ida Water-race .. .. .	8,399 19 5	8,399 19 5	..
Mountain Hut Water-race .. .. .	72 4 1	72 4 1	..
Gentle Annie Creek, Mata, R. Kelly .. .. .	200 0 0	40 0 0	60 0 0
Finlay McLiver .. .. .	400 0 0	34 5 4	165 14 8
Sulky Gully Water-race .. .. .	504 0 0	179 3 4	38 16 8
Argyle Water-race .. .. .	550 0 0	200 0 0	150 0 0
	42,751 2 11	40,961 18 10	1,008 3 9
<b>DRAINAGE- AND TAILINGS-CHANNELS.</b>			
Kumara Sludge-channel No. 5 .. .. .	5,339 8 4	3,316 6 5	2,023 1 11
Trustees' Main Tail-race, Waimea .. .. .	1,800 0 0	885 19 1	114 0 11
Kelly's Terrace Tunnel .. .. .	1,562 10 0	460 13 7	1,131 16 5
	8,701 18 4	4,663 19 1	3,268 19 3
<b>WATER-CONSERVATION ON GOLDFIELDS.</b>			
Engineer's salary and expenses .. .. .	245 15 7	245 15 7	..
Eweburn Reservoir .. .. .	180 15 8	180 15 8	..
Coromandel Harbour and Kuaotunu Sludge-channel .. .. .	80 12 6	80 12 6	..
	507 3 9	507 3 9	..

LIST OF WORKS ON GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
<i>Summary of Works.</i>			
Roads (subsidised)—	£ s. d.	£ s. d.	£ s. d.
Coromandel County .. .. .	1,900 0 0	350 0 0	600 0 0
Thames County .. .. .	950 0 0	110 4 6	466 15 6
Thames Borough .. .. .	1,176 0 0	..	588 0 0
Ohinemuri County .. .. .	4,355 10 0	459 7 1	1,773 4 7
Te Aroha Town Board .. .. .	150 0 0	48 15 0	31 5 0
Katikati Road Board .. .. .	400 0 0	100 0 0	100 0 0
Piako County .. .. .	250 0 0	..	125 0 0
Pierson Road Board .. .. .	100 0 0	..	50 0 0
Pelorus Road Board .. .. .	50 0 0	..	30 0 0
Collingwood County .. .. .	200 0 0	..	100 0 0
Buller County .. .. .	1,950 0 0	66 13 4	908 6 8
Inangahua County .. .. .	200 0 0	80 9 0	19 11 0
Grey County .. .. .	4,536 0 0	2,325 0 0	1,971 10 0
Westland County .. .. .	150 0 0	17 8 0	57 12 0
Tuapeka County .. .. .	11,892 0 0	5,689 10 9	1,381 9 3
Lake County .. .. .	4,244 0 0	500 0 0	1,000 0 0
Southland County .. .. .	600 0 0	..	450 0 0
	33,103 10 0	9,742 7 8	9,602 14 0
Works constructed wholly by Mines Department ..	77,764 16 1	43,781 18 9	33,982 17 4
Schools of Mines .. .. .	22,607 19 9	22,607 19 9	..
Prospecting subsidies .. .. .	29,737 19 4	5,444 0 10	1,581 13 0
Prospecting deep levels .. .. .	25,500 0 0	24,218 9 5	1,281 10 7
Water-races .. .. .	42,751 2 11	40,961 18 10	1,003 8 9
Drainage- and tailings-channels .. .. .	8,701 18 4	4,662 19 1	3,268 19 3
Compensation, proclamation of rivers .. .. .	5,196 13 10	5,196 13 10	..
Water-conservation on goldfields .. .. .	507 8 9	507 8 9	..
Total .. .. .	245,821 4 0	157,123 11 11	50,720 17 11

## LIST OF WORKS ON GOLDFIELDS constructed wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, and completed prior to the 31st March, 1898.

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
<b>NORTH ISLAND.</b>		
<b>ROADS (SUBSIDISED).</b>		
<i>Bay of Islands County.</i>		
Tiriwhanga Gorge to Galbraith's Road, Puhipuhi .. .. .	£ s. d. 237 0 0	£ s. d. 118 10 0
Air-line Road to battery-site, Puhipuhi .. .. .	78 0 0	36 10 0
Tiriwhanga Gorge to Puhipuhi .. .. .	800 0 0	800 0 0
New Bay of Islands Coal Company .. .. .	500 0 0	250 0 0
Road, Taumarere Railway-station to Puhipuhi .. .. .	482 0 0	146 0 0
	2,092 0 0	1,351 0 0
<i>Coromandel County.</i>		
Improving road to Iona and Just in Time Companies' mines .. .. .	200 0 0	133 6 8
Making and improving track from Tokatea towards Kennedy Bay .. .. .	320 0 0	218 6 8
Golden Belt Track .. .. .	100 0 0	50 0 0
Tokatea Road (repairs) .. .. .	300 0 0	150 0 0
Making and improving track from Golden Belt to Tiki .. .. .	239 3 3	159 8 10
Making road from Ring's Bridge to Kapanga Mine .. .. .	150 0 0	100 0 0
Making road to Kapanga Mine .. .. .	132 0 0	88 0 0
Temporary track from Tokatea Saddle to Waikoromiko .. .. .	50 0 0	33 6 8
Continuation of track from Success Company's mine to top of main range .. .. .	80 0 0	53 6 8
Completion of road from Tokatea Saddle to Tokatea Battery .. .. .	50 0 0	33 6 8
Widening road from Matawai to Vaughan's claim .. .. .	357 0 0	238 0 0
Improving track, Mercury Bay to Waitai .. .. .	100 0 0	66 13 4
Continuation and improving Waikoromiko Track .. .. .	150 0 0	100 0 0
Emily Battery to Rocky Creek .. .. .	60 0 0	40 0 0
Track, Bismarck Battery to Kennedy Bay .. .. .	200 0 0	123 6 8
Road up Manaia .. .. .	675 10 6	450 7 0
Extension of Vaughan's and Vizard's Tracks .. .. .	150 0 0	100 0 0
Vizard's towards Marebel .. .. .	200 0 0	133 6 8
Extending and widening Waitaia Road .. .. .	100 0 0	66 13 4
Makarau to Waiau .. .. .	1,600 0 0	1,066 13 4
Waikawau to Tiki .. .. .	500 0 0	333 6 8
Paul's Creek to Cabbage Bay .. .. .	200 0 0	133 6 8
Waikawau Creek Track .. .. .	100 0 0	50 0 0

## LIST OF WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
<i>Coromandel County—continued.</i>						
McLaughlin's Road .. .. .	100	0	0	50	0	0
Manaia to McGregor's new find .. .. .	100	0	0	50	0	0
Manaia to Tiki .. .. .	500	0	0	250	0	0
Old sawmill towards Matawai .. .. .	200	0	0	100	0	0
Extension of Paul's Creek Track .. .. .	300	0	0	150	0	0
Matarangi Track .. .. .	400	0	0	200	0	0
Thames-Coromandel Road, <i>via</i> Manaia .. .. .	300	0	0	150	0	0
Harbour View extension .. .. .	210	0	0	105	0	0
Kapanga to Paul's Creek .. .. .	200	0	0	100	0	0
Mercury Bay to Kuaotunu .. .. .	330	0	0	180	0	0
Wainara to Kuaotunu .. .. .	450	0	0	225	0	0
Sea-beach to Kuaotunu .. .. .	1,650	0	0	1,450	0	0
Just in Time Road, extension to Coromandel .. .. .	450	0	0	225	0	0
Road, Waikawau Bridge to McLaughlin's .. .. .	67	10	0	45	0	0
Mercury Bay Road .. .. .	990	0	0	495	0	0
Bridge to Dugend's store, and widening and metalling road from bridge to Log Hut..	450	0	0	300	0	0
Road from junction of Red Mercury battery up Pumpkin Flat to Waitaia .. .. .	345	0	0	230	0	0
To connect road from Log Hut to commencement of contract of Kuaotunu-Mercury Bay Road .. .. .	150	0	0	100	0	0
Road, with culverts and bridge, from Kapanga Hill to Scotty's Gold-mining Company's mine .. .. .	200	0	0	150	0	0
Pumpkin Flat—Just in Time Road .. .. .	310	0	0	170	0	0
Lower road from Great Mercury battery to Kapai low level and battery-site .. .. .	450	0	0	300	0	0
Road from main road, Kapanga to Success Mine .. .. .	600	0	0	300	0	0
Cemetery Road and Bridge, Kuaotunu .. .. .	100	0	0	75	0	0
Road from Coromandel-Kennedy Bay Main Road to Wareroa Creek .. .. .	300	0	0	150	0	0
Leading Wind Mine Road .. .. .	100	0	0	50	0	0
Fury's Bridge .. .. .	450	0	0	225	0	0
Carroll's Bridge .. .. .	400	0	0	200	0	0
Horne's Bridge .. .. .	200	0	0	100	0	0
Road from Main Kennedy Bay Road to Monte Carlo and other claims .. .. .	300	0	0	150	0	0
Castle Rock Mine Road, Tiki .. .. .	200	0	0	100	0	0
Road between Bismarck Battery and Hauraki Associated Gold Reefs .. .. .	400	0	0	200	0	0
	17,246	8	9	10,500	15	10
<i>Te Aroha Town Board.</i>						
Road to connect with railway-station .. .. .	120	0	0	60	0	0
Lipseys's Bridge .. .. .	64	0	0	32	0	0
	184	0	0	92	0	0
<i>Thames County.</i>						
Making new road from Ohinemuri River to Karangahake Quarts-mine .. .. .	650	0	0	483	6	8
Dray-road to connect Otanui Mines with crushing-battery at Maungawherawhera Creek .. .. .	710	0	0	478	6	8
Improving roads from Waitekaui Road to Katikati Road .. .. .	250	0	0	166	18	4
Improving road up Karaka Creek to Lucky Hit Company's mine .. .. .	268	1	0	175	7	4
Improving road to upper mines, Waitahi .. .. .	258	18	10	172	12	7
Karangahake to battery .. .. .	300	0	0	200	0	0
Ralph's Battery, Waitekaui .. .. .	399	1	0	199	10	6
Otanui Road to mines .. .. .	299	18	0	199	18	8
Road to Wick's Battery .. .. .	70	0	0	46	13	4
Rocky Point Road, Tararu .. .. .	300	0	0	200	0	0
Thames Borough boundary to hematite-mine .. .. .	350	0	0	233	6	8
Widening road from bridge over Hape Creek to Otanui Mines .. .. .	188	17	0	122	11	4
Track, Karangahake Goldfield .. .. .	784	1	0	522	14	0
Kauaeranga Valley to Otanui .. .. .	470	7	0	313	11	4
Tapu Road to mines .. .. .	81	17	9	54	11	10
Tauranga Road to Karangahake Bridge site .. .. .	341	5	0	227	10	0
Karangahake Bridge .. .. .	229	6	6	152	17	8
Track up Maungakerikeri Creek .. .. .	98	4	4	62	2	11
Thames Borough boundary to Hape Creek No. 2 .. .. .	600	0	0	300	0	0
Upper Karaka Road .. .. .	179	18	0	119	15	4
Repairing flood-damages, Waitahi, Moanataiari, Karaka, and Collarbone Roads .. .. .	350	0	0	175	0	0
Sea-beach to Waiomo .. .. .	750	0	0	375	0	0
Te Papa Gully Road .. .. .	75	0	0	37	10	0
New Find to Waiomo Battery .. .. .	110	0	0	55	0	0
Rocky Point Road .. .. .	429	11	10	214	15	11
Waitahi towards Mercury Bay .. .. .	522	11	0	261	5	6
Te Mata Road .. .. .	178	17	6	89	8	9
Waiomo Creek to Tapu .. .. .	1,499	0	0	749	10	0
Alabama Creek Track .. .. .	100	0	0	50	0	0
Road from Prospectors' Mine, Puriri, to battery .. .. .	50	0	0	25	0	0
Karaka Creek to Lucky Hit .. .. .	365	0	0	182	10	0
Bullion Mine, Tapu, to battery .. .. .	86	5	0	18	2	6
Track to Hikutaia Goldfield .. .. .	147	15	2	73	17	7
Upper Tararu Road to Sylvia Mine .. .. .	684	7	0	342	3	6
Road to Puriri Battery .. .. .	11	13	0	5	16	6
Thames-Waikawau Road .. .. .	37	10	0	18	15	0
Track from Tararu Creek Road to McDermot's Claim .. .. .	45	0	0	22	10	0
Track to Try Fluke Claim, Tapu .. .. .	94	15	0	47	7	6
Waiomo to Puhoi Creek .. .. .	88	0	0	16	10	0

## LIST of WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
<i>Thames County—continued.</i>		
Waioakaraka Road, Bella Street, and Campbell Street to Moanataiari Creek ..	£ 200 0 0	£ 100 0 0
Moanataiari Creek Road .. .. .	100 0 0	50 0 0
Tararu Creek Road and Tararu Road .. .. .	150 0 0	75 0 0
Hape Creek Road .. .. .	150 0 0	75 0 0
	12,934 15 11	7,436 12 11
<i>Thames Borough.</i>		
Repairing roads .. .. .	975 19 2	600 0 0
<i>Ohinemuri County.</i>		
Jubilee Mine Track .. .. .	118 0 0	59 0 0
Track up Tui Creek .. .. .	306 0 0	153 0 0
Prospecting track, Whangamata and Waitekauri .. .. .	200 0 0	166 13 4
Tramway, Karangahake to Railey's reduction-works .. .. .	400 0 0	200 0 0
Strengthening bridges, Waihi Road .. .. .	200 0 0	133 6 8
Paeroa to Hikutaia .. .. .	400 0 0	200 0 0
Repairs, flood-damages .. .. .	34 13 8	17 6 10
Hikutaia River to Marototo Mine .. .. .	180 15 0	90 7 6
Karangahake through Gorge (bridge and culverts) .. .. .	200 0 0	100 0 0
Waitekauri Lower Road .. .. .	360 0 0	189 2 8
Metalling Karangahake Gorge Road .. .. .	170 0 0	85 0 0
Karangahake and Waihi Road .. .. .	237 10 0	118 15 0
Karangahake Hill Track .. .. .	87 4 0	43 12 0
Bridge over Ohinemuri River at Karangahake .. .. .	12 11 0	6 5 6
Hikutaia-Paeroa Road .. .. .	500 0 0	250 0 0
Paeroa-Te Aroha Road .. .. .	200 0 0	100 0 0
Tui Creek Track .. .. .	129 18 6	64 19 3
Waitekauri to Lowrie's and Birnie's .. .. .	200 0 0	100 0 0
Road, Karangahake to Waihi .. .. .	246 12 3	164 8 2
Lower Waitekauri Road .. .. .	347 13 4	230 16 4
Road, Thames Road to Netherton Punt .. .. .	60 0 0	50 0 0
Komata Creek Road .. .. .	600 0 0	300 0 0
	5,190 17 9	2,822 13 3
<i>Prako County.</i>		
Extension and completion of Te Aroha Tramway .. .. .	18,000 0 0	12,000 0 0
Tramway to Fergusson's Battery, Waiorongomai .. .. .	1,500 0 0	1,000 0 0
Road, Waiorongomai .. .. .	497 17 0	331 18 0
Track to claims at Buck's Reef .. .. .	55 5 6	36 17 0
Track, Fern Spur to Butler's Spur .. .. .	231 17 9	154 11 10
Tracks up Stony Creek, Te Aroha Goldfield, &c. .. .. .	54 0 0	36 0 0
Repairs, Upper Premier Track and new track towards Waitawheta .. .. .	40 0 0	20 0 0
Repairs, Te Aroha-Lichfield Road .. .. .	302 0 0	125 0 0
	20,681 0 3	13,704 6 10
<i>Hutt County.</i>		
Road to connect Otorongo Bay with Albion Company's battery, also to connect Terawhiti Quartz-mine with battery .. .. .	509 16 6	210 17 0
Road, Makara Junction to Terawhiti .. .. .	450 0 0	225 0 0
	959 16 6	435 17 0
<b>SOUTH ISLAND.</b>		
<b>(ROADS SUBSIDISED).</b>		
<i>Mariborough County.</i>		
Track, Deep Creek to Dead Horse Creek .. .. .	68 0 0	45 6 8
Mouth of Gorge to Forks, Cullensville to Mahakipawa Diggings .. .. .	450 0 0	225 0 0
Formation of road at Cullensville, Mahakipawa .. .. .	217 4 0	108 12 0
Havelock-Mahakipawa Road .. .. .	905 0 0	505 0 0
Dead Horse Creek to Sunnyside .. .. .	75 0 0	50 0 0
	1,715 4 0	933 18 8
<i>Waimea County.</i>		
Road to open up Table Diggings .. .. .	260 0 0	130 0 0
Punt over Motueka River .. .. .	100 0 0	50 0 0
Repairing Baton to Table-land Track .. .. .	40 0 0	20 0 0
Dove River to Baton Saddle, and from Rolling River to Wangapeka Saddle .. .. .	120 0 0	60 0 0
	520 0 0	260 0 0
<i>Collingwood County.</i>		
Road, West Wanganui .. .. .	300 0 0	200 0 0
Bridge over Aorere River .. .. .	173 14 0	115 16 0
Extending Anatoki Bridle-track .. .. .	160 0 0	80 0 0
Bridge over Takaka River at Pain's Ford .. .. .	1,597 7 8	798 13 10
Repairs Silverstream Bridge and forming and metalling Bainham Road .. .. .	200 0 0	100 0 0
	2,431 1 8	1,294 9 10



## LIST OF WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
<i>Buller County.</i>						
Deviation of road from Candlelight Flat to Deep Creek, Charleston .. ..	870	0	0	246	13	4
Road from Orowaiti Lagoon to North Terrace .. ..	256	18	6	171	5	8
Prospecting track from Razorback to Paparoa Range .. ..	100	0	0	66	13	4
Track from Seatonville to Larrikin's .. ..	438	9	6	292	6	4
Waimangaroa to Denniston .. ..	787	0	0	393	10	0
Road to connect alluvial workings with Charleston Road .. ..	400	0	0	266	13	4
Track, Four-mile Creek towards Grey Valley .. ..	300	0	0	200	0	0
Road to connect alluvial diggings north of Deadman's Creek .. ..	278	0	0	185	6	8
Ngakawau to Mokihinui, <i>via</i> beaches .. ..	100	0	0	66	13	4
Road to connect Ngakawau Railway with Mokihinui Coal Company's workings .. ..	193	0	0	128	13	4
Lyell Bluff to Victor Emmanuel Claim .. ..	650	0	0	433	6	8
Beach, Little Wanganui to Mokihinui .. ..	300	0	0	100	0	0
Cape Foulwind Road .. ..	450	0	0	300	0	0
Road up Nile Valley .. ..	56	16	4	28	8	2
Danniston extension .. ..	850	0	0	425	0	0
Promised Land towards Motueka .. ..	380	0	0	190	0	0
Road over Gentle Annie .. ..	200	0	0	100	0	0
Extension, Lyell Creek to Low-level Tunnel .. ..	60	0	0	30	0	0
Extension of track 50 chains south of Brighton .. ..	140	0	0	70	0	0
Continuation of road, Deadman's Creek .. ..	437	17	0	218	18	6
Ngakawau Railway-station to Mokihinui .. ..	50	0	0	25	0	0
Addison's Flat towards ranges .. ..	20	0	0	10	0	0
North Terrace to Oparara Diggings .. ..	500	0	0	333	6	8
Extension of Croninville Road .. ..	100	0	0	50	0	0
Waimangaroa to sea-beach .. ..	80	0	0	40	0	0
Extension of track, Oparara to Fenian Creek .. ..	100	0	0	50	0	0
Con's Creek to Beaconsfield .. ..	80	0	0	40	0	0
Addison's Flat to Caroline Terrace .. ..	200	0	0	100	0	0
Waimangaroa to sea-beach extension .. ..	390	0	0	195	0	0
Addison's Flat to Gallagher's Lead .. ..	50	0	0	25	0	0
Road to Swanston's Gold-mining Company .. ..	50	0	0	25	0	0
Repairs to roads at Lyell .. ..	200	0	0	100	0	0
Track, Fairdown from North Terrace .. ..	150	0	0	97	8	0
Improving Road to Four-mile Creek, Charleston .. ..	900	0	0	450	0	0
	9,618	1	4	5,454	3	4
<i>Inangahua County.</i>						
Dray-road from Soldier's Creek to Devil's Creek .. ..	647	0	0	431	6	8
Dray-road from Inangahua to Rainy Creek Battery .. ..	900	10	0	606	6	8
Dray-road from Capleston up Little Boatman's Creek .. ..	379	0	0	252	13	4
Dray-road from Capleston up Main Boatman's Creek .. ..	697	0	0	464	13	4
Dray-road from Westport Road to Inangahua River .. ..	224	5	0	149	10	0
Track from Devil's Creek to Big River .. ..	134	3	6	89	9	0
Track from Waitahu River to Capleston .. ..	358	0	0	238	13	4
Survey and expenses .. ..	250	0	0	166	13	4
Track from Cariboo to Big River .. ..	728	0	0	364	0	0
Dray-road up Murray Creek to United Inglewood Claim .. ..	3,472	0	0	2,314	17	4
Road from Reefton to Big River, <i>via</i> Devil's Creek .. ..	614	0	0	307	0	0
Road up Big River .. ..	922	19	0	615	6	0
Continuation of dray-road up Little Boatman's Creek .. ..	169	7	6	112	18	4
Road from Capleston to Larry's Creek .. ..	640	0	0	426	13	4
Track to connect Capleston with Lone Star .. ..	75	0	0	50	0	0
Crushington to Globe Company's workings .. ..	403	0	0	201	10	0
Snowy Creek Track .. ..	85	15	0	42	17	6
Reefton to Big River .. ..	1,792	0	0	1,194	13	4
Glenroy to Horse Terrace .. ..	254	0	0	122	10	0
Devil's Creek to Globe Hill .. ..	917	6	2	458	13	1
Extension of dray-road to Boatman's <i>via</i> Painkiller .. ..	53	17	6	26	18	9
Mangles Valley to McGregor's Station .. ..	600	0	0	300	0	0
Globe Hill to Merrijigs .. ..	1,397	6	0	698	13	0
Larry's Creek to Lyell .. ..	1,061	15	0	530	17	6
Widening Larry's Creek Road .. ..	118	10	0	59	5	0
Road up Burke's Creek, Little Boatman's .. ..	149	0	0	74	10	0
	17,052	14	8	10,900	8	10
<i>Grey County.</i>						
Road from No Town to Deep Creek .. ..	1,100	0	0	550	0	0
Road from Langdon's to Moonlight .. ..	1,600	0	0	800	0	0
Contribution from goldfields vote towards main road .. ..	2,296	6	6	2,296	6	6
Track, Waipuna to Clarke's River .. ..	1,200	0	0	800	0	0
Track, Cameron's to Cape Terrace .. ..	700	0	0	466	13	4
Road, Limestone to Maori Creek .. ..	800	0	0	533	6	8
Red Jack's to Nelson Creek .. ..	601	17	6	401	5	0
Barrytown to Deadman's .. ..	2,240	0	0	1,493	6	8
German Gully to Arnold's Flat .. ..	120	0	0	60	0	0
Baird's Terrace to Lake Brunner .. ..	400	0	0	200	0	0
Hatter's Terrace Road .. ..	1,000	0	0	500	0	0
Irishman's to Lake Brunner .. ..	2,400	0	0	1,200	0	0
Hatter's Terrace .. ..	600	0	0	400	0	0
Track, Baird's Terrace to Irishman's .. ..	250	0	0	125	0	0
Deep Creek to Bell Hill .. ..	1,331	0	0	665	10	0
Track to Blackball Diggings .. ..	790	0	0	395	0	0

## LIST of WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
<i>Grey County—continued.</i>		
Track from Ahaura, Kapara, Reese's Flat, to new rush on banks of Ahaura River ..	£ s. d. 20 0 0	£ s. d. 10 0 0
Renewal, bridge over Nelson Creek, Marsden-Dunganville Road ..	38 0 0	19 0 0
Repairs (corduroying), Cobden-Seven-mile Road ..	36 0 0	18 0 0
Repairs, Cobden-Point Elizabeth Road ..	30 0 0	15 0 0
Extension Ngahere-Blackball Road to Blackball Ferry ..	50 0 0	25 0 0
	17,603 4 0	10,973 8 2
<i>Westland County.</i>		
Improving track, Butcher's Creek to Gentle Annie Terrace ..	225 10 0	163 13 4
Bridle-track to Kanieri Lake ..	719 11 0	350 5 6
Bridle-track to Eel Creek ..	168 9 0	84 4 6
Tunnel-track, Galway Beach to Gillespie's Beach ..	487 5 0	218 12 6
Road from Duffer's Creek, Greenstone Road, to fifteen-mile peg, Christchurch Road	726 9 0	480 4 6
Continuation of track, Back Creek to Eel Creek ..	249 4 0	166 3 4
Bridle-track, Duffer's Creek, Bowen and Okarito Road, to sea-beach ..	333 18 0	222 12 0
Rees Borough boundary to Mount Greenland ..	1,280 15 0	853 16 8
Track, Kanieri Lake to Humphrey's Gully ..	279 2 0	186 1 4
Track, Larrikin's to Loop-line Dam ..	449 11 0	299 14 0
Rough Wainihinihi to Upper Dam ..	450 0 0	300 0 0
Browning's Pass to Reefs ..	3,311 6 0	2,207 10 8
Okarito Forks to Teal Creek ..	600 0 0	400 0 0
Road, Christchurch to Baldhill Range reefs ..	500 0 0	250 0 0
Extension of Tucker's Flat Road to New Rush ..	170 19 6	85 9 9
Hokitika Borough boundary (Reefton) to Shotover Rush ..	120 0 0	60 0 0
Track to New Rush, Back Creek ..	100 0 0	50 0 0
Repairing old track round Wataroa Bluff ..	50 0 0	25 0 0
New Rush, south side of Hokitika River ..	37 18 6	18 19 3
Cedar Creek Road to Farmer's Creek ..	55 7 0	27 13 6
Road to gold discovery near Blue Spur ..	75 0 0	37 10 0
Widening Seddon's Terrace Track ..	150 0 0	65 10 0
Branch Road at Seddon's Terrace ..	38 10 6	19 5 3
	10,528 15 6	6,581 6 1
<i>Tairāhiki County.</i>		
Mullooky Gully to Silver Peak ..	499 15 0	338 3 4
<i>Lake County.</i>		
Track, Skipper's to Phoenix and Scandinavian Reefs ..	292 2 3	194 14 10
Track to connect scheelite-mine with Lake Wakatipu ..	225 0 0	150 0 0
Arrowtown to Macetown, construction ..	225 0 0	150 0 0
Arrowtown to Macetown, maintenance ..	150 0 0	100 0 0
Invincible Quartz-reef Track, Rees River ..	300 0 0	200 0 0
Rees Valley to company's workings ..	61 7 6	30 13 9
Pack-track, Criffel Diggings ..	50 6 6	33 11 0
Left-hand Branch Road, Skipper's ..	63 9 10	31 14 11
Old Morven Ferry Road ..	289 0 0	144 10 0
Road to workings above Cardrona ..	70 0 0	35 0 0
Piers, Victoria Bridge ..	725 0 0	362 10 0
Skipper's Road Saddle to Deep Creek ..	200 0 0	100 0 0
	2,651 6 1	1,582 14 6
<i>Trapsaka County.</i>		
Making road from top of Terrace to Waipori Bush ..	300 0 0	200 0 0
Road, Beaumont to Remarkable Bush ..	300 0 0	200 0 0
Improving road from Waipori Township to antimony-mines, Lammerlaw Ranges ..	200 0 0	133 6 8
Waipori Township to Waipori Bush ..	200 0 0	133 6 8
Clutha River to Campbell's ..	76 9 0	50 19 4
Waitahuna to copper-mine ..	200 0 0	133 6 8
Road to open up quarry for Waitahuna Bridge ..	160 9 10	106 19 11
Waipori Road, <i>via</i> Bungtown ..	566 8 10	283 4 5
	2,003 7 8	1,241 8 8
<i>Wallace County.</i>		
Track, Colac Bay to Round Hill ..	200 0 0	133 6 8
Pack-track to Round Hill, Colac, and Orepuki ..	1,050 0 0	500 0 0
Cutting tracks, Longwood ..	59 6 0	29 13 0
	1,309 6 0	662 19 8
<i>Vincent County.</i>		
Renewal bridge to Bannockburn ..	1,532 0 0	850 0 0
<i>Maniototo County.</i>		
Road to Serpentine Diggings ..	136 10 0	91 0 0
Pig and Whistle to Clarke's Diggings ..	200 0 0	133 6 8
Shepherd's Hut Flat to Vinegar Hill ..	100 0 0	66 13 4
Kyburn Peninsula to main road ..	82 0 0	41 0 0
	518 10 0	332 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.						Total Cost.	Amount of Contribution paid by Mines Department.
						£ s. d.	£ s. d.
<i>Fiord County.</i>							
Dusky Sound, tracks	..	..	..	..	..	300 0 0	200 0 0
<i>Waitaki County.</i>							
Road, Naseby to Livingstone	..	..	..	..	..	41 12 0	20 16 0
<i>Southland County.</i>							
Improving tracks from Mataura to Nokomai	..	..	..	..	..	75 0 0	50 0 0
Improving road, Waikaka to Leatham	..	..	..	..	..	150 0 0	100 0 0
Improving road from Waikaka Township to Leatham Creek	..	..	..	..	..	30 0 0	20 0 0
Improving road from Waikaka to Waikaka railway-siding	..	..	..	..	..	150 0 0	100 0 0
Widening and improving bush-track to Waikawa	..	..	..	..	..	150 0 0	100 0 0
Waikaka to Switzer's	..	..	..	..	..	150 0 0	100 0 0
Road near Waikaka Township	..	..	..	..	..	150 0 0	100 0 0
Waikaia to Whitcombe	..	..	..	..	..	311 6 8	180 13 4
Waipapa to Six-mile Beach	..	..	..	..	..	175 0 0	87 10 0
Repairing bridges, Waikaia Bush	..	..	..	..	..	38 13 4	13 4 0
						1,380 0 0	851 7 4
<i>DIAMOND AND OTHER DRILLS.</i>							
Inangahua County Council (diamond)	..	..	..	..	..	2,000 0 0	1,000 0 0
Springfield Colliery Company (diamond)	..	..	..	..	..	1,250 0 0	625 0 0
Westland County Council (tiffin)	..	..	..	..	..	350 0 0	233 0 0
Diamond drills for prospecting purposes..	..	..	..	..	..	1,570 11 4	1,570 11 4
						5,170 11 4	3,428 11 4
<i>WHARVES.</i>							
Repairs to wharf, Coromandel	..	..	..	..	..	300 0 0	150 0 0
Anikiwi Jetty, Marlborough	..	..	..	..	..	135 15 9	135 15 9
						435 15 9	285 15 9
<i>AIDS TO PROSPECTING.</i>							
Construction of low-level tunnel, Terawhiti	..	..	..	..	..	750 0 0	150 0 0
Queen of Beauty Company, prospecting deep levels	..	..	..	..	..	300 0 0	150 0 0
Caledonian Low-level Company, prospecting deep levels	..	..	..	..	..	300 0 0	150 0 0
Red Hill Gold-mining Company, prospecting deep levels	..	..	..	..	..	600 0 0	300 0 0
Caledonian Low-level Company, low-level tunnel	..	..	..	..	..	2,700 0 0	300 0 0
Lyell Creek Extended Company, low-level tunnel	..	..	..	..	..	300 0 0	150 0 0
New Cromwell Gold-mining Company	..	..	..	..	..	250 0 0	100 0 0
Deep-level Association, Waipori	..	..	..	..	..	450 0 0	300 0 0
Little Boatman's deep-level tunnel	..	..	..	..	..	600 0 0	300 0 0
Oterongia Prospecting Association	..	..	..	..	..	198 17 2	99 8 7
Vincent County	..	..	..	..	..	187 9 0	68 14 6
Tapanui Prospecting Association	..	..	..	..	..	25 0 0	12 10 0
Tuapeka County	..	..	..	..	..	12 0 0	6 0 0
Maniototo County	..	..	..	..	..	500 0 0	250 0 0
Pullar, Shelmardine, and Basan	..	..	..	..	..	400 0 0	200 0 0
Royal Oak Association	..	..	..	..	..	300 0 0	150 0 0
Star of the East Quartz-mining Company	..	..	..	..	..	150 0 0	75 0 0
West Coast Prospecting Association	..	..	..	..	..	300 0 0	150 0 0
McBride and party	..	..	..	..	..	169 2 2	84 11 1
McLean and party	..	..	..	..	..	66 0 0	33 0 0
Deep-level Tunnel, Tokatea	..	..	..	..	..	700 0 0	350 0 0
Deep-level Tunnel, Owaharoa	..	..	..	..	..	300 8 0	200 5 4
Deep-level Tunnel, Tapu	..	..	..	..	..	1,200 0 0	600 0 0
Deep-level Tunnel, Cedar Creek	..	..	..	..	..	1,207 10 0	603 15 0
Manuka Flat Prospecting Association	..	..	..	..	..	200 0 0	100 0 0
Red Hill Minerals Company	..	..	..	..	..	437 19 10	218 19 11
Tuapeka Prospecting Association	..	..	..	..	..	277 0 0	138 10 0
Cardrona Prospecting Association	..	..	..	..	..	800 0 0	400 0 0
Cromwell Prospecting Association	..	..	..	..	..	500 0 0	250 0 0
Coromandel County	..	..	..	..	..	550 0 0	275 0 0
Thames County	..	..	..	..	..	309 18 0	154 19 0
Thames Borough	..	..	..	..	..	200 0 0	100 0 0
Buller County	..	..	..	..	..	146 12 6	73 6 3
Inangahua County	..	..	..	..	..	488 7 0	244 3 6
Westland County	..	..	..	..	..	1,236 19 4	618 9 8
Grey County	..	..	..	..	..	871 15 2	435 17 7
Deep-level Prospecting Association, Waipori	..	..	..	..	..	432 9 8	216 4 10
Waipu Prospecting Association	..	..	..	..	..	180 0 0	90 0 0
Hokianga County	..	..	..	..	..	100 0 0	50 0 0
Vulcan Smelting-works, Onehunga	..	..	..	..	..	30 0 0	15 0 0
Ohinemuri County	..	..	..	..	..	100 0 0	50 0 0
Waitaki County	..	..	..	..	..	29 5 0	14 12 6
Waihemo County	..	..	..	..	..	85 9 0	42 14 0
William Fox and party	..	..	..	..	..	711 1 8	355 10 11
Kirk and party	..	..	..	..	..	176 0 10	88 4 10
Hodge and party	..	..	..	..	..	98 13 8	49 6 18
Carey and Hyndman	..	..	..	..	..	441 9 4	220 14 0
Don, Boyce, and party	..	..	..	..	..	107 16 0	53 18 0
Quentin McKinnon	..	..	..	..	..	58 10 0	29 5 0

LIST OF WORKS ON GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
<i>AIDS TO PROSPECTING—continued.</i>		
Bullion Mine, Deep-level Tunnel .. .. .	£ 300 0 0	£ 150 0 0
Sutherland and party .. .. .	30 0 0	15 0 0
Inangahua Low-level Tunnel .. .. .	6,966 0 0	3,000 0 0
Deep-level Tunnel, Manaia .. .. .	451 4 0	225 12 0
Waimea Miners' Association, prospecting at Callaghan's .. .. .	50 0 0	50 0 0
Totara Miners' Association, Ross .. .. .	51 3 6	51 3 6
Ross, Cunningham, and another .. .. .	9 0 0	9 0 0
Wm. Thompson, stores from Benmore Station .. .. .	2 1 10	2 1 10
Totara Miners' Association, Ross .. .. .	8 6 6	8 6 6
Harris, Davidson, and party .. .. .	27 7 6	27 7 0
Boatman's Tailings Company .. .. .	150 0 0	150 0 0
Boys's Tunnel, Bluespur .. .. .	94 12 3	94 12 0
Totara Miners' Association, Ross, Montina and party .. .. .	246 10 0	246 10 0
Gillam's Gully Prospecting Association .. .. .	94 15 0	94 15 0
Deep-level Prospecting Committee, Dillmanstown .. .. .	407 0 3	407 0 3
Westport Prospecting Association .. .. .	25 0 0	25 0 0
Te Aroha Prospecting Association .. .. .	20 12 6	20 12 6
Robert Richie, Kuaotunu .. .. .	72 8 0	36 1 0
Owharoa Tunnel, Lindsay Jackson .. .. .	325 0 0	162 10 0
Coromandel County (£ for £) .. .. .	200 0 0	100 0 0
Mr. G. Rehay, Arahura .. .. .	98 15 0	49 7 6
Hyndman and party, Callaghan's Flat .. .. .	552 14 6	276 7 3
Lakes Mapourika, Waiho, and Wataroa Miners' Association .. .. .	53 12 0	26 16 0
Kumara Miners' Association .. .. .	22 10 0	11 5 0
Thames Miners' Union .. .. .	75 15 0	37 17 6
Star of Canterbury Miners' Association .. .. .	38 5 0	19 2 6
Miners' Association, Rimu .. .. .	16 0 0	8 0 0
Buller County, Messrs. Negri and others .. .. .	27 0 0	13 10 0
Johnson and party, tunnel at Callaghan's Flat .. .. .	90 0 0	45 0 0
W. L. Webb, Nelson .. .. .	24 0 0	12 0 0
Kumara Miners' Association, Solberg, Stewart, and party .. .. .	64 15 0	32 7 6
Buller County, between head of Fox's River, Brighton, and Deadman's Creek .. .. .	29 5 0	14 12 6
Welcome United Gold-mining Company, Greymouth .. .. .	245 12 6	122 16 3
Orepuki Miners' Association .. .. .	90 0 0	45 0 0
Totara Miners' Association, Gagliardi and party .. .. .	12 10 0	6 5 0
Contingencies .. .. .	484 15 10	242 7 11
Halligan and party (tunnel at Cedar Creek) .. .. .	198 1 10	99 0 11
Totara Miners' Association (Chamberlain and party) .. .. .	208 10 0	104 5 0
Miners' Association, Greenstone .. .. .	59 0 0	29 10 0
Westland County, T. Radonicki and party .. .. .	40 0 0	20 0 0
Waimea Miners' Association (Lot, Keir, and party) .. .. .	90 0 0	45 0 0
Cardrona Prospecting Association .. .. .	140 5 4	70 2 8
Waimea Miners' Association, Stafford .. .. .	113 1 0	56 10 6
H. Crossan, Beaumont .. .. .	28 0 0	14 0 0
Prospecting Association, Westport .. .. .	39 0 0	19 10 0
Cape Colville Prospecting Syndicate .. .. .	32 0 0	16 0 0
Port Charles Prospecting Association .. .. .	28 0 0	14 0 0
Totara Miners' Association, Ross .. .. .	24 0 0	12 0 0
Lake Mapourika Miners' Association .. .. .	12 0 0	6 0 0
Lister and Robertson, Karama .. .. .	13 0 0	13 0 0
Canada Reefs Tunnel .. .. .	187 10 0	93 15 0
Otago Miners' Association .. .. .	600 0 0	291 8 2
Westland County (Goudie and party) .. .. .	215 19 9	107 19 6
Paparata Road Board .. .. .	26 0 0	13 0 0
Tauranga County, Te Puke Prospecting Association .. .. .	50 0 0	25 0 0
Havelock Miners' Association .. .. .	78 0 0	39 0 0
Ohinemuri County .. .. .	200 0 0	6 0 0
Mr. Olderg, Arahura .. .. .	54 18 0	16 4 0
Miners' Association, Ross (J. Smith and party) .. .. .	135 0 0	61 7 6
Extension of low-level tunnel, Boatman's .. .. .	300 0 0	137 7 11
Prospecting tunnel, south side Inangahua River .. .. .	60 0 0	25 0 0
Prospecting Association, Mokihinui .. .. .	40 0 0	15 0 0
Miners' Association, Kumara (John Kane) .. .. .	9 0 0	1 2 6
Prospecting Association, Invercargill .. .. .	150 0 0	68 13 6
Miners' Association, Kuaotunu .. .. .	40 0 0	13 2 6
Miners' Association, Ross (Waylen and party) .. .. .	50 0 0	16 13 0
Prospecting Association, Coromandel (Leahy and others) .. .. .	200 0 0	100 0 0
Adit level, Maungatawhiri Creek (G. B. Osmond) .. .. .	120 0 0	68 17 0
Bay of Islands County Prospecting, Pokaka .. .. .	112 13 0	112 13 0
Prospecting Russell's Outcrop .. .. .	100 0 0	100 0 0
Fox's River Prospecting Association (A. T. Bate, Secretary) .. .. .	19 10 0	19 10 0
Buller County (Newton and party, shaft, Ballarat Terrace) .. .. .	22 15 0	22 15 0
Buller County (Spence and party) .. .. .	19 10 0	19 10 0
Wairau Miners' Association .. .. .	50 0 0	48 4 0
Miners' Association, Nelson Creek (Thrower and Potts) .. .. .	45 0 0	45 0 0
Miners' Association, Dillmanstown (Turnbull and others) .. .. .	7 10 0	7 10 0
Miners' Association, Ross (Gagliardi and party) .. .. .	64 18 0	64 18 0
Miners' Association, Ross (Allen and Son) .. .. .	40 0 0	20 0 0
Miners' Association, Ross (A. Zala) .. .. .	42 15 0	42 15 0
Miners' Association, Greenstone (Black and party) .. .. .	27 0 0	27 0 0
Miners' Association, Cardrona .. .. .	40 0 0	40 0 0
Miners' Association, Lowburn (E. Murrell) .. .. .	20 0 0	13 5 0
Puhipuhi Prospecting Association .. .. .	200 0 0	13 15 0
Thames County (F. and J. Wallis) .. .. .	97 10 0	35 19 2

LIST OF WORKS ON GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
<b>AIDS TO PROSPECTING—<i>continued.</i></b>		
Thames County (Sheridan Company's tunnel, Tapu) .. .. .	£ 180 10 0	£ 30 5 0
Cinnabar Mining Company, Auckland (£1 to £1 10s.) .. .. .	162 16 9	108 11 2
H. H. Adam's, Waorongomai .. .. .	250 0 0	48 3 9
Miners' Association, Ross (C. Porter) .. .. .	226 0 0	125 3 0
Miners' Association, Ross (Moye and Son) .. .. .	15 10 0	6 10 6
Westland County (J. Staines) .. .. .	96 0 0	4 10 0
Westland County (O'Brien and Glynn) .. .. .	40 0 0	36 10 6
Upper Montere Road Board .. .. .	40 0 0	1 16 0
Buller County (Mohan and party) .. .. .	220 0 0	71 8 6
Buller County (Gardiner and McKay) .. .. .	56 0 0	24 0 0
Buller County (Negri and others) .. .. .	43 0 0	29 1 3
Buller County (Scarlett and McHarrie) .. .. .	39 0 0	18 0 0
Kumara Miners' Association (Scatterini and Anderson) .. .. .	124 0 0	6 13 6
Kumara Miners' Association (Henley and party) .. .. .	58 14 0	2 8 0
Kumara Miners' Association (M. Manton) .. .. .	57 10 0	3 18 9
Kumara Miners' Association (Rogers and Block) .. .. .	75 0 0	35 6 6
Frying-pan Tail-race .. .. .	600 0 0	161 11 3
Prospecting Association, Mokihinui (French and others) .. .. .	58 10 0	11 5 0
Prospecting Association, Westport .. .. .	432 6 0	197 9 8
Dyer and party, Kuaotunu .. .. .	120 0 0	37 16 0
Gillam's Gully Prospecting Association (Bramhall and party) .. .. .	60 0 0	12 3 0
Miners' Association, Riverton .. .. .	100 0 0	32 0 0
Kennedy-Waikai Miners' Association, Invercargill .. .. .	100 0 0	9 0 0
Inangahua District Miners' Association .. .. .	100 0 0	25 17 6
New El Dorado Sluicing Company, Fat Boys, Criffel .. .. .	300 0 0	94 4 9
Miners' Association, Greenstone (O'Donnell and party, and J. Pope) .. .. .	75 0 0	30 4 3
Miners' Association, Tinkers, prospecting Matakani .. .. .	6 0 0	3 0 0
Chatterbox Tunnel (G. Clapton) .. .. .	6 0 0	2 17 9
Port Charles Prospecting Association .. .. .	20 0 0	11 8 0
Miners' Association, Lake Mapourika .. .. .	17 4 0	7 13 3
Pitchers and Kitto, Anderson's Flat .. .. .	100 0 0	20 5 11
Miners' Association, Nelson Creek (Kelly and party) .. .. .	23 5 0	9 18 0
South British Prospecting Association, Lyell .. .. .	135 0 0	6 15 0
	40,380 1 2	18,883 9 10
<b>WATER-RACES.</b>		
Water-main, Bull's Battery .. .. .	350 0 0	100 0 0
Round Hill Water-race .. .. .	200 19 0	138 19 4
Tomkias's Water-race .. .. .	100 0 0	100 0 0
Cardrona Sludge-channel .. .. .	100 0 0	50 0 0
New water-mains, Thames Water-race .. .. .	1,479 10 4	739 15 2
Argyle Water-race .. .. .	8,108 15 1	8,108 15 1
Nelson Creek .. .. .	957 16 9	957 16 9
Mikonui Water-race .. .. .	14,279 16 4	14,279 16 4
Brown and party, Kumara .. .. .	90 0 0	22 10 0
Randall Creek Water-race .. .. .	222 2 3	222 2 3
Thames Water-race .. .. .	1,250 0 0	1,250 0 0
Contingencies .. .. .	659 12 8	659 12 8
Randall Creek Water-race .. .. .	100 15 0	100 15 0
Quinn's Creek Water-race .. .. .	70 0 0	70 0 0
Wainihinihi Water-race .. .. .	84 3 8	84 3 8
Survey, water-race, Ninety-mile Beach .. .. .	65 6 7	65 6 7
Improving water-supply, Oamaru .. .. .	1,250 0 0	1,150 7 2
Roaring Meg Water-race (Jones, Baxter, and party) .. .. .	1,600 0 0	478 16 5
	31,468 6 7	28,568 16 5
<b>DRAINAGE- AND TAILINGS-CHANNELS.</b>		
Drainage-channel, Lawrence (total cost, approximate) .. .. .	3,000 0 0	2,000 0 0
Subsidy towards purchase of Messrs. Laidlaw and Crawford's freehold in Spotti's Creek, to allow tailings to be deposited (Tinker's Diggings) .. .. .	500 0 0	400 0 0
Damage by floods, Thames .. .. .	1,000 0 0	500 0 0
Sludge-channel, Smith's Gully, Bannockburn .. .. .	1,000 0 0	251 1 0
Round Hill Sludge-channel survey .. .. .	52 19 7	52 19 7
Compensation to J. Costello, damage done by tailings .. .. .	788 0 0	788 0 0
Long Gully Sludge-channel .. .. .	150 0 0	100 0 0
New Pipeclay Gully Sludge-channel .. .. .	1,547 18 0	773 19 0
Kumara Sludge-channel No. 2 .. .. .	2,762 17 2	2,762 17 2
Ophir Tail-race .. .. .	2,300 0 0	1,150 0 0
Lawrence Drainage-channel .. .. .	1,150 0 0	956 14 0
Muddy Creek Channel .. .. .	2,000 0 0	1,000 0 0
St. Bathans Channel .. .. .	2,000 0 0	1,000 0 0
Tailings-outlet, Maerewhenua .. .. .	1,595 4 0	1,595 4 0
Ross Sludge- and Storm-water-channel .. .. .	1,675 10 6	1,675 10 6
Kumara Sludge-channel No. 4 .. .. .	1,000 0 0	1,000 0 0
Kuaotunu Sludge-channel (£ for £) .. .. .	400 0 0	200 0 0
Branch tail-race to No. 4 Channel .. .. .	100 0 0	100 0 0
Rimu Drainage-channel .. .. .	500 0 0	191 19 6
	23,522 9 3	16,498 4 9
<b>AID TOWARDS THE TREATMENT OF ORES.</b>		
Testing-plant, School of Mines, Thames .. .. .	1,200 0 0	600 0 0
Testing minerals, Dunedin Exhibition .. .. .	142 8 9	142 8 9
	1,342 8 9	742 8 9

## LIST OF WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
AID TOWARDS CONSTRUCTION OF TELEPHONE LINES.						
Bannockburn to Nevis .. .. .	60	0	0	50	0	0
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT.						
Construction of road, Arrowtown to Macetown .. .. .	9,270	6	8	9,270	6	8
Road to open up Woodstock Goldfield .. .. .	1,000	0	0	1,000	0	0
Ahaurā to Amuri .. .. .	2,504	19	7	2,504	19	7
Waikaia Bush Road .. .. .	1,000	0	0	1,000	0	0
Waitahuna Bridge .. .. .	750	0	0	750	0	0
Merrivale tracks .. .. .	500	0	0	500	0	0
Mokihinui to Specimen Creek .. .. .	1,238	7	5	1,238	7	5
Wilberforce Quartz-reef Road .. .. .	1,830	17	7	1,830	17	7
Opening Mokau River .. .. .	552	8	0	552	8	0
Lyell to Mokihinui .. .. .	5,098	8	6	5,098	8	6
Brighton to Seventeen-mile Beach .. .. .	1,789	7	2	1,789	7	2
Whangapeka to Karamea .. .. .	2,000	0	0	2,000	0	0
Hatter's Terrace to Bell Hill .. .. .	500	0	0	500	0	0
Cedar Creek Road .. .. .	3,000	0	0	3,000	0	0
Owen Valley Road .. .. .	2,208	9	2	2,208	9	2
Cobden to Seventeen-mile Beach .. .. .	3,036	1	4	3,036	1	4
Cedar Creek Road .. .. .	1,500	0	0	1,500	0	0
Bridle-track to Upper Anatoki .. .. .	722	8	0	722	8	0
Whangamata Road .. .. .	141	10	6	141	10	6
Karangahake through Gorge .. .. .	1,000	0	0	1,000	0	0
Arthur's Point to Skipper's .. .. .	12,167	4	1	12,167	4	1
Tracks to Coal Island .. .. .	54	6	3	54	6	3
Grey Valley to Teremakau .. .. .	900	0	0	900	0	0
Rimu to New Rush .. .. .	829	17	9	829	17	9
Tapu to Waikawau .. .. .	750	10	0	750	10	0
Puhipuhi Road .. .. .	1,396	17	9	1,396	17	9
Jackson's Bay to Cascade and George River district .. .. .	5,310	10	11	5,310	10	11
Improving roads and tracks, Collingwood to Takaka and Motueka .. .. .	10,905	8	11	10,905	8	11
Tramway from New Find to Waitekauri .. .. .	100	0	0	100	0	0
Havelock-Mahakipawa Dray-road .. .. .	1,311	9	0	1,311	9	0
Mokihinui to Wanganui .. .. .	200	0	0	200	0	0
Burnett's Face to Coalbrookdale .. .. .	200	0	0	200	0	0
Deadman's to Christmas Terrace .. .. .	20	0	0	20	0	0
Low-level Alpine Claim, Lyell .. .. .	80	0	0	80	0	0
Bowen Road to Salt-water Beach .. .. .	60	0	0	60	0	0
Repairing damage done by floods, Westland County .. .. .	100	0	0	100	0	0
Deviation of road at Kanieri Forks .. .. .	140	0	0	140	0	0
Road up Dart River .. .. .	200	0	0	200	0	0
Kuaotunu to Mercury Bay .. .. .	350	0	0	350	0	0
Thames to Manaia .. .. .	500	0	0	500	0	0
Cobden to Seventeen-mile Beach .. .. .	400	0	0	400	0	0
Bridge over Mahinapua Creek .. .. .	503	16	10	503	16	10
Track up Waiho River .. .. .	105	0	0	105	0	0
Haast Ferry to Glue-pot .. .. .	126	0	0	126	0	0
Paeroa-Waihi Road .. .. .	114	0	0	114	0	0
Waitekauri to New Find .. .. .	250	0	0	250	0	0
Mahakipawa to Waikakaho .. .. .	183	12	1	183	12	1
Oparara through gorge to gold-workings .. .. .	150	0	0	150	0	0
Okira Bridge, at Dirty Mary's Creek .. .. .	100	0	0	100	0	0
Lagoon Bridge .. .. .	100	0	0	100	0	0
Widening Cape Terrace Road .. .. .	100	0	0	100	0	0
Deviation, Granville Road .. .. .	70	0	0	70	0	0
Tucker's Flat Road .. .. .	247	18	7	247	18	7
Dillman's-Larrikin's Road .. .. .	125	15	0	125	15	0
Track at Kanieri Lake and McIntosh Falls, Lake Mahinapua .. .. .	195	4	6	195	4	6
Extension of road, Rimu to Shallow Rush .. .. .	150	0	0	150	0	0
Gillam's Gully Track .. .. .	149	16	0	149	16	0
McKay's Creek, Kokatahi Track .. .. .	100	0	0	100	0	0
Aorere Valley to Karamea and Mokihinui .. .. .	29,938	1	2	29,938	1	2
Arrowtown to Macetown .. .. .	450	0	0	450	0	0
Nelson Creek Bridge .. .. .	100	0	0	100	0	0
Cascade to Barn Bay Road .. .. .	411	7	0	411	7	0
Repairs to decking, Tapu Wharf .. .. .	100	0	0	100	0	0
Waitekauri Battery from Junction-Waihi Road .. .. .	150	0	0	150	0	0
Deep Creek, Wakamarina, to Empire City Company's claim .. .. .	50	0	0	50	0	0
Track to diggings at Cape Foulwind .. .. .	497	11	0	497	11	0
Bridge over Fox's River at Brighton .. .. .	100	0	0	100	0	0
Totara Bridge .. .. .	255	0	0	255	0	0
Road from Mokihinui Bridge to gold-workings .. .. .	75	0	0	75	0	0
Clearing two miles of old track from right-hand branch of Kanieri River to Gentle Annie Terrace .. .. .	13	0	0	13	0	0
Extending horse-track to Blackball Creek .. .. .	500	0	0	500	0	0
Matawai to Kaimarama .. .. .	150	0	0	150	0	0
Tiki to Mahakirau .. .. .	250	0	0	250	0	0
Karangahake Gorge to Waihi .. .. .	350	0	0	350	0	0
Upper Tararu Road .. .. .	471	10	3	471	10	3
Red Hill Road .. .. .	249	8	1	249	8	1
Repairs, Nile Bridge .. .. .	1,131	2	6	1,131	2	6
Miller's Flat to Skipper's .. .. .	580	0	0	580	0	0
Cobden to Coal Creek .. .. .	375	0	0	375	0	0
Track to New Find, Tairua .. .. .	47	11	6	47	11	6

## LIST of WORKS on GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.	Amount of Contributions paid by Mines Department.
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—continued.		
Cedar Creek Dray-road .. .. .	£ 466 11 2	£ 466 11 2
Road to Matarangi Goldfield .. .. .	75 0 0	75 0 0
Repairs, Manaia Track .. .. .	90 0 0	90 0 0
Upper Township School Bridge .. .. .	50 0 0	50 0 0
Tiki Bridge across Waiau .. .. .	256 0 0	256 0 0
Scott's Bridge .. .. .	175 0 0	175 0 0
Otau Bridge .. .. .	150 0 0	150 0 0
Mercury Bay—Kaimarama Road .. .. .	50 0 0	50 0 0
Stoney Creek Track .. .. .	15 0 0	15 0 0
Road to mines, Waiomo .. .. .	50 0 0	50 0 0
Upper Hill Track to branch track, Waiorongomai .. .. .	30 0 0	30 0 0
Canadian Gully Bridge, and repairs to tunnel on horse-grade, Waiorongomai .. .. .	70 0 0	70 0 0
Waiorongomai Road .. .. .	100 0 0	100 0 0
Track from Slate River to Rocky .. .. .	225 0 0	225 0 0
Pack-track to Killdevil .. .. .	100 0 0	100 0 0
Repairs, Wangapeka Road towards Crow Diggings .. .. .	153 0 7	153 0 7
Repairing flood-damages, Grey County .. .. .	370 0 0	370 0 0
Taipo Track to Seven-mile .. .. .	194 5 8	194 5 8
Repairs, Totara Bridge .. .. .	336 0 0	336 0 0
Repairs, Kanieri Lake Road .. .. .	80 0 0	80 0 0
Mercury Bay to Whenuakite and Boat Harbour .. .. .	150 0 0	150 0 0
Tiki to Gum Town, via Kaimarama .. .. .	160 0 0	160 0 0
Driving Creek to Cabbage Bay and Driving Creek to Cape Colville .. .. .	660 0 0	660 0 0
Tiki to Waikawau .. .. .	600 0 0	600 0 0
Paeroa to Te Aroha .. .. .	365 0 0	365 0 0
Puriri to east side of range .. .. .	596 19 6	596 19 6
Onamalutu to Wakamarina Forks .. .. .	400 0 0	400 0 0
Waimangaroa to Denniston .. .. .	100 0 0	100 0 0
Road to Lyell's Creek Extended Company's tunnel .. .. .	200 0 0	200 0 0
Jackson's Bay to Cascade .. .. .	1,110 8 1	1,110 8 1
Bridge over Ogilvie's Creek .. .. .	150 0 0	150 0 0
Gillam's Gully Track .. .. .	230 0 0	230 0 0
Bridge over Kanieri River at Kokatahi .. .. .	467 10 10	467 10 10
Road to Oparara Diggings .. .. .	100 0 0	100 0 0
Millerton Road .. .. .	249 0 3	249 0 3
Waiau to Preservation Inlet .. .. .	7,961 19 6	7,961 19 6
Hatter's Terrace to Haupiri .. .. .	1,650 0 0	1,650 0 0
Grey River to Moonlight .. .. .	530 0 0	530 0 0
Blackball Track .. .. .	1,185 12 5	1,185 12 5
Ahaura—Kopara Road .. .. .	400 0 0	400 0 0
Mackley's to Waipuna Terrace .. .. .	100 0 0	100 0 0
Footbridge over Blackball Creek .. .. .	150 0 0	150 0 0
Waipapa to Waikawa .. .. .	200 0 0	200 0 0
Waipapa to Six-mile .. .. .	100 0 0	100 0 0
Drain at Adamson's .. .. .	50 0 0	50 0 0
Maruia Track, between Reefton and Maruia .. .. .	50 0 0	50 0 0
Sledge-track to Langdon Reefs .. .. .	30 0 0	30 0 0
Track to Blackball Township, repairs .. .. .	40 0 0	40 0 0
Track, Old Man Range .. .. .	50 0 0	50 0 0
Road to gold discovery near Blue Spur .. .. .	45 0 0	45 0 0
Bartlett's Creek Track .. .. .	200 0 0	200 0 0
Prospecting track, Brunnerton to Paparoa .. .. .	125 0 0	125 0 0
Extension Seddon's Terrace Track to new claim .. .. .	208 10 6	208 10 6
West Tokatea Road .. .. .	50 0 0	50 0 0
Waitaia Battery Road .. .. .	150 0 0	150 0 0
Preece's Point Road .. .. .	150 0 0	150 0 0
Tokatea—Kennedy Bay Road .. .. .	100 0 0	100 0 0
Main Cabbage Bay Road .. .. .	50 0 0	50 0 0
Hooker's to Mercury Bay .. .. .	100 0 0	100 0 0
Opeto Road .. .. .	100 0 0	100 0 0
Blagrove's Road .. .. .	400 0 0	400 0 0
Cemetery—Cabbage Bay Road .. .. .	100 0 0	100 0 0
Rails for Coromandel Wharf .. .. .	31 5 0	31 5 0
Culverts, Tiki Road .. .. .	100 0 0	100 0 0
Soldier's Creek Road .. .. .	198 5 0	198 5 0
Road to Barrytown .. .. .	300 0 0	300 0 0
Tracks to Western Sounds .. .. .	7,307 17 11	7,307 17 11
Road to R. Kelly's Claim, Gentle Annie Creek .. .. .	100 0 0	100 0 0
Waitekauri to New Find .. .. .	250 0 0	250 0 0
Paeroa Mill Road .. .. .	50 0 0	50 0 0
Owharoa to Waitawheta .. .. .	50 0 0	50 0 0
Deviation Road, Earl's Hill .. .. .	200 0 0	200 0 0
Waihi to Katikati .. .. .	75 0 0	75 0 0
Bridge over Slate River .. .. .	50 0 0	50 0 0
Pack-track to Glover's Flat, Lower Anatoki .. .. .	50 0 0	50 0 0
Clearing Karaka Creek of flood-damage .. .. .	50 0 0	50 0 0
Track up right-hand branch of Cullen's Creek .. .. .	25 0 0	25 0 0
Footbridge, Waimangaroa River .. .. .	50 0 0	50 0 0
Track up Calary Branch, Waiho River .. .. .	70 0 0	70 0 0
Converting Wilson's Lead Track, Addison's, into a dray-road .. .. .	400 0 0	400 0 0
Cabbage Bay to Port Charles and Cape Colville .. .. .	1,200 0 0	1,200 0 0
Cabbage Bay to mines .. .. .	400 0 0	400 0 0
Coromandel to Cabbage Bay .. .. .	250 0 0	250 0 0
Tokatea to Kennedy Bay .. .. .	200 0 0	200 0 0

## LIST OF WORKS ON GOLDFIELDS, &amp;c.—continued.

Locality and Nature of Works.	Total Cost.			Amount of Contributions paid by Mines Department.		
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—continued.						
	£	s.	d.	£	s.	d.
Coromandel to Kuaotunu .. .. .	2,070	0	0	2,070	0	0
Tiki to Manaia .. .. .	300	0	0	300	0	0
Manaia to Waikawau .. .. .	1,500	0	0	1,500	0	0
Kuaotunu to Mercury Bay .. .. .	750	0	0	750	0	0
Manaia to mines .. .. .	100	0	0	100	0	0
Whitianga to Mahikirau .. .. .	300	0	0	300	0	0
Whangapoua Mill Road .. .. .	100	0	0	100	0	0
Kuaotunu Bridge .. .. .	200	0	0	200	0	0
Granity Creek to Ngakawau .. .. .	100	0	0	100	0	0
Crow Diggings Track .. .. .	527	8	2	527	8	2
Road to diggings, Cape Foulwind .. .. .	100	0	0	100	0	0
Ngahere to Blackball .. .. .	600	0	0	600	0	0
Ahaura to Haupiri .. .. .	200	0	0	200	0	0
Fencing land, Blackball Road .. .. .	110	0	0	110	0	0
Prospecting track, Greek's Gully to Kanieri Forks .. .. .	150	0	0	150	0	0
Repairing Jones's Creek and Donohue's Storm-channels .. .. .	100	0	0	100	0	0
Deviation, Pleasant Creek Track .. .. .	130	0	0	130	0	0
Road-works at Ohaeawai .. .. .	500	0	0	500	0	0
Mahakirau Creek Road .. .. .	200	0	0	200	0	0
Puriri to mines .. .. .	100	0	0	100	0	0
Katikati-Waihi Road .. .. .	150	0	0	150	0	0
Pack-track from Kerikeri .. .. .	50	0	0	50	0	0
Track to Waitakohe Goldfield .. .. .	50	0	0	50	0	0
Repairing bridges to mines, Te Puke .. .. .	250	0	0	250	0	0
Helena Bay to Whakapara Railway-station .. .. .	100	0	0	100	0	0
Gordon Settlement to Waharoa .. .. .	600	0	0	600	0	0
Waiorongomai Road .. .. .	300	0	0	300	0	0
Approach to Railway Bridge, Te Aroha .. .. .	150	0	0	150	0	0
Thompson's Track .. .. .	3,523	19	11	3,523	19	11
Upper Waitekauri Bridge .. .. .	250	0	0	250	0	0
Junction Waihi Road to New Find, Waitekauri .. .. .	328	8	0	328	8	0
Canaan Road .. .. .	200	0	0	200	0	0
Repairing bridges, Doctor's and Staunton's Creeks .. .. .	200	0	0	200	0	0
Four-mile Bridge .. .. .	100	0	0	100	0	0
Fox's Bridge .. .. .	100	0	0	100	0	0
Fairdown-Waimangaroa .. .. .	200	0	0	200	0	0
Charleston-Nine-mile Beach .. .. .	200	0	0	209	0	0
Road, Promised Land-Karamea .. .. .	550	0	0	550	0	0
Karamea Bridge and approaches .. .. .	3,565	19	8	3,565	19	8
Approaches, Matakitaki Bridge .. .. .	279	15	0	279	15	0
Snowy Creek Bridge .. .. .	300	0	0	300	0	0
Big River Road .. .. .	4,571	0	0	4,571	0	0
Footbridge across by-wash, Ngahere-Blackball Ferry .. .. .	210	0	0	210	0	0
Track to Healey's Gully .. .. .	90	0	0	90	0	0
Track, Lancashire Flat to head of Clearwater Creek .. .. .	50	0	0	50	0	0
Granville Road .. .. .	100	0	0	100	0	0
Footbridges, Blackwater and Greenstone .. .. .	300	0	0	300	0	0
Brown's Terrace to Arnold .. .. .	200	0	0	200	0	0
Protective works, main Grey Bridge .. .. .	191	0	0	191	0	0
Extension, Tucker's Flat Road .. .. .	103	2	6	103	2	6
Butcher's Creek Bridge, Kanieri Lake Road .. .. .	129	17	6	129	17	6
Kapitea Creek Bridge, Lamplough Track .. .. .	118	0	0	118	0	0
Great South Road .. .. .	11,478	3	6	11,478	3	6
Widening Milltown Track to Humphrey's Gully .. .. .	600	0	0	600	0	0
Pack-track, Seddon's Terrace to Eel Creek .. .. .	246	17	6	246	17	6
New bridge, Kapitea Creek, Loop-line Road .. .. .	30	8	7	30	8	7
Stribbing's Creek Bridge .. .. .	70	8	11	70	8	11
Widening Seddon's Terrace Road Extension .. .. .	199	0	0	199	0	0
Compensation, Larrikin's Road .. .. .	56	0	0	56	0	0
Garston to Nevis .. .. .	1,965	17	2	1,965	17	2
Nevis Valley Road .. .. .	400	0	0	400	0	0
Okarito River Bridge .. .. .	300	0	0	300	0	0
Stafford-Awatuna .. .. .	390	13	11	390	13	11
Drainage, Stafford Township .. .. .	399	1	5	399	1	5
Wataroa Bluff Track .. .. .	194	4	8	194	4	8
Wangapeka Track, Rolling River-Kiwi Creek .. .. .	149	19	10	149	19	10
Tracks, Stewart's Island .. .. .	718	7	8	718	7	8
Hokitika-Jackson's .. .. .	1,332	16	2	1,332	16	2
Widening Lake Mapourika-Waiho Road .. .. .	782	6	8	782	6	8
Roads, Great Barrier .. .. .	604	4	2	604	4	2
Riversdale-Waikaia .. .. .	200	0	0	200	0	0
Prospecting track, Lyell-Larry's .. .. .	100	0	0	100	0	0
Track to New Find, Victoria Range .. .. .	500	0	0	500	0	0
Extending road into bush, Addison's .. .. .	100	0	0	100	0	0
Clearing rocks and easing curves, Nine- and Ten-mile Bluffs .. .. .	129	6	11	129	6	11
Repairs flood damages, South Westland .. .. .	100	0	0	100	0	0
Hungerford's Bridge .. .. .	444	11	5	444	11	5
Waitangi Bluff Track .. .. .	99	18	9	99	18	9
Track from Cedar Creek Road to Ford and Thompson's claim .. .. .	20	0	0	20	0	0
Repairs Mount Greenland Track .. .. .	50	0	0	50	0	0
Ross Road, towards Ranges .. .. .	199	12	6	199	12	6
Repairs Pack Track, Cedar Creek .. .. .	100	0	0	100	0	0
Kinsella's land, taken for Blackball Road .. .. .	5	11	0	5	11	0



LIST OF WORKS ON GOLDFIELDS—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contributions paid by Mines Department.
<b>WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—<i>continued.</i></b>		
Maratoto to Mines .. .. .	£ 149 5 6	£ 149 5 6
Hatter's Terrace—Haupiri .. .. .	200 0 0	200 0 0
Upper Waiotahi Road .. .. .	492 10 0	492 10 0
Inland from Omaha .. .. .	400 0 0	400 0 0
Gannon's to Painkiller .. .. .	198 10 6	198 10 6
Contingencies .. .. .	697 11 10	697 11 10
	<b>198,749 8 4</b>	<b>198,749 8 4</b>
<b>ROADS TO OPEN UP MINES OTHER THAN GOLD.</b>		
Aniseed Valley to Champion Copper-mine .. .. .	4,968 10 6	4,116 10 6
Richmond Hill to copper-mine .. .. .	315 16 0	209 4 0
Track, Ohinemuri Coal-seam .. .. .	267 3 4	133 11 8
Road, Kanieri Coalfield .. .. .	600 0 0	300 0 0
	<b>6,146 9 10</b>	<b>4,759 6 2</b>
<b>TRACKS TO OPEN UP MINERAL LANDS.</b>		
Glory Harbour to Kopack .. .. .	50 0 0	50 0 0
Port Pegasus Track .. .. .	155 7 6	155 7 6
Removing snags and felling timber, Mokau River .. .. .	40 0 0	40 0 0
Ngakawau Footbridge .. .. .	80 0 7	80 0 7
	<b>325 8 1</b>	<b>325 8 1</b>
<b>REPAIRING FLOOD-DAMAGES.</b>		
Thames Borough .. .. .	500 0 0	500 0 0
<b>ARTESIAN-WELL BORING.</b>		
Maniototo Plains .. .. .	800 0 0	800 0 0
<b>RESUMPTION OF LAND FOR MINING.</b>		
Resumption of J. Holmes's land at Kumara for a tailings-site .. .. .	300 0 0	300 0 0

*Summary of Works.*

	£ s. d.	£ s. d.
<b>Roads (subsidised)—</b>		
Bay of Islands County .. .. .	2,092 0 0	1,351 0 0
Coromandel County .. .. .	17,246 3 9	10,500 15 10
Te Aroha Town Board .. .. .	184 0 0	92 0 0
Thames County .. .. .	12,934 15 11	7,436 12 11
Thames Borough .. .. .	975 19 2	600 0 0
Ohinemuri County .. .. .	5,190 17 9	2,822 13 3
Piako County .. .. .	20,681 0 3	13,704 6 10
Hutt County .. .. .	959 16 6	435 17 0
Marlborough County .. .. .	1,715 4 0	933 18 8
Waimea County .. .. .	520 0 0	260 0 0
Collingwood County .. .. .	2,481 1 8	1,294 9 10
Buller County .. .. .	9,618 1 4	5,454 3 4
Inangahua County .. .. .	17,052 14 8	10,300 8 10
Grey County .. .. .	17,603 4 0	10,973 8 2
Westland County .. .. .	10,528 15 6	6,581 6 1
Taieri County .. .. .	499 15 0	333 3 4
Lake County .. .. .	2,651 6 1	1,532 14 6
Tuapeka County .. .. .	2,003 7 8	1,241 3 8
Wallace County .. .. .	1,309 6 0	662 19 8
Maniototo County .. .. .	518 10 0	332 0 0
Vincent County .. .. .	1,532 0 0	850 0 0
Fiord County .. .. .	300 0 0	200 0 0
Waitaki County .. .. .	41 12 0	20 16 0
Southland County .. .. .	1,380 0 0	851 7 4
	<b>129,969 11 3</b>	<b>78,765 5 3</b>
Diamond and other drills .. .. .	5,170 11 4	3,428 11 4
Wharves .. .. .	435 15 9	285 15 9
Aids to prospecting .. .. .	40,330 1 2	18,383 9 10
Water-races .. .. .	31,463 6 7	28,568 16 5
Drainage- and sludge-channels .. .. .	23,522 9 3	16,498 4 9
Aid towards treatment of ores .. .. .	1,342 8 9	742 8 9
Roads wholly constructed by Mines Department .. .. .	198,749 8 4	198,749 8 4
Roads to open up mines other than gold .. .. .	6,146 9 10	4,759 6 2
Tracks to open up mineral lands .. .. .	325 8 1	325 8 1
Repairing flood-damages .. .. .	500 0 0	500 0 0
Artesian-well boring, Maniototo Plains .. .. .	800 0 0	800 0 0
Resumption of land for mining .. .. .	300 0 0	300 0 0
Aid towards construction of telephone lines .. .. .	60 0 0	50 0 0
	<b>439,115 10 4</b>	<b>352,156 14 8</b>

RETURN showing the VALUE of the SALES of WATER, and EXPENDITURE on, and COLLATERAL ADVANTAGES derived from, the Working of the WATER-RACES constructed and maintained by GOVERNMENT during the Year ending 31st March, 1898.

Name of Water-race.	Value of Sales of Water and Channel-fees.	Expenditure on Maintenance.	Profit or Loss.	Cost of Construction.	Total Cost of Construction.	Percentage on Capital invested.	Average Number of Men employed.	Approximate Amount of Gold obtained.	Value of Gold obtained.	Average Weekly Earnings of Men after deducting Value of Sales of Water and Channel-fees.
Waimea .. ..	£ s. d. 787 18 7	£ s. d. 677 1 6	£ s. d. 110 17 1	£ s. d. 138,691 11 1	£ s. d. 90,722 10 8	..	49.5	Oz. 2,409	£ s. d. 9,395 2 0	£ s. d. 3 6 10
Kumara .. ..	2,889 3 3	1,841 0 0	1,048 3 3	42,166 2 8	202,763 11 11	..	71.88	4,720	18,408 0 0	4 3 0
Kumara Sludge-channel ..	..	..	..	21,984 18 2	..	..	..	..	..	..
Nelson Creek .. ..	..	..	..	..	90,722 10 8	..	..	..	..	..
Argyle .. ..	..	..	..	..	15,151 15 3	..	..	..	..	..
Mikouui .. ..	..	..	..	..	25,927 4 6	..	..	..	..	..
Mount Ida .. ..	1,895 18 11	1,894 18 9	11 0 2	69,756 9 6	69,756 9 6	..	61	2,885	11,107 5 0	3 1 2
Blackstone Hill .. ..	126 16 1	30 10 0	96 6 1	..	..	..	8.75	160	616 0 0	1 1 0
Callaghan's .. ..	172 0 0	125 5 0	46 15 0	6,027 15 6	..	..	7.37	315	1,228 10 0	3 3 0
Totals .. ..	5,371 16 10	4,058 15 3	1,313 1 7	278,546 16 11	404,320 11 10	..	..	10,489	40,754 17 0	..

GEORGE WILSON, Inspecting Engineer.

Approximate Cost of Paper.—Preparation, not given; printing (3,750 copies), £379

Price 4s.

By Authority: JOHN MACKAY, Government Printer, Wellington.—1898.



1898.  
NEW ZEALAND.

---

# REPORTS OF WARDENS AND OTHER OFFICERS ON GOLDFIELDS.

*Presented to both Houses of the General Assembly by Command of His Excellency.*

## No. 1.

Mr. Warden HUTCHISON to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Auckland, 25th May, 1898.

It becomes my duty to report upon the state of the Puhipuhi Gold-mining District during the past year, and I regret that my report cannot be of a satisfactory character. The hope expressed by my predecessor in his report of last year that "next year's report might show improvement in this field in the shape of one or two mines employing the full number of men and being able to pay working-expenses from results obtained" has not been fulfilled. My report must rather be that there has been no improvement whatever. The majority of claims upon the register are virtually dead, awaiting only formal decrees of forfeiture for non-payment of rent and non-working; and the remaining few, which are not liable to forfeiture, have only been kept alive by a system of protection and reduced labour. Of effective mining work there has been none.

The claims in existence are: (1.) Three known as the Great Northern Nos. 1, 2, and 3, covering 296 acres. These were surrendered claims taken up by a gentleman on behalf of a syndicate on the 9th September, 1897. No work has been done upon these claims. They should normally give employment to ninety-eight men. Protection was granted on the 2nd December, 1897, for three months, in order to give time to raise capital for working and developing the mines. That period has expired, and there is now pending an application to work with one man, which is simply an application to keep the claim alive without working. The application is based upon the ground that a company has been promoted in England with a large working capital and time is required to make arrangements for so doing. The application has been adjourned for evidence of its *bona fides*. (2.) Two claims, known as the Star of England and the Star of England Extended, are owned by the Montezuma Company, of Te Aroha. These were taken up in February last. The usual application for protection is pending. No work has yet been done on these claims, but I understand that a quantity of stone has been extracted for testing purposes. In addition to these claims, two applications for abandoned ground have recently been granted, and some further applications of a similar nature are pending, but that this is to be taken as a sign of a real revival I should be slow to affirm—indeed, it is stated that the cause of this activity is to be found in the report before alluded to, that a company has been floated in England with a capital of £25,000 to work the Great Northern Claims.

On the whole, therefore, I regret to say my report must be that there has been no progress in mining during the past year in the Puhipuhi district.

I have, &c.,

J. HUTCHISON, Warden.

The Under-Secretary, Mines Department, Wellington.

## No. 2.

Mr. Warden BUSH to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Thames, 1st June, 1898.

I have the honour to submit my annual report upon the Hauraki Mining District:—

THAMES COUNTY.

During the past year very important works have been in progress in connection with the systematic development of our most important mines.

The erection of the pumping and winding machinery at the Queen of Beauty shaft by the Thames-Hauraki Company is perhaps the most important, for upon the success of this company practically depends the future of Thames proper. The general opinion, founded upon the knowledge that has been acquired in the carrying-out of similar works in other parts of the world and that several known reefs exist in the Queen of Beauty section, is that it will turn out a success.

1—C. 3A.

The Moanataiari Company has completed a magnificent crushing plant, and hope with it to successfully treat the low-grade ore which is to be found in the mine.

It is probable that it will be at this battery that the ore from the Thames-Hauraki will be treated.

In the Waiomo district the discovery of a process to successfully treat the Monowai ore should cause other companies to be formed for the purpose of working the different refractory ores which are found there.

The failure of the Broken Hill Mine, at Tairua, caused that district to be deserted. The only mines now working at Whangamata are the Whangamata Proprietary and the Wentworth. Almost all the other claims have been forfeited or surrendered.

#### TAPU DISTRICT.

The most important mine in this locality is that of the Mahara Royal (Limited), an English company. A ten-stamp battery, driven by water, has been erected at a cost of £2,500. Abundance of payable quartz is being obtained to keep the mill going, and a large quantity of tailings, valued at £1 per ton, has been saved for future treatment. A low-level tunnel is about to be commenced to test the lode at a depth, and should the ore prove as valuable as in the upper workings an additional ten stamps will be erected. The prospects of this mine are considered excellent.

*Sheridan.*—A company was formed in Napier with a capital of £10,000 to work this mine. Operations have been carried on vigorously in generally opening up the mine, but work is now being confined to developing the main reef on the low level. For some time past the reef has not turned out as well as was expected, but a change for the better has now occurred, and the outlook is much brighter. The company has actually spent £4,000 for a return of £160, and deserve better luck.

The Jessie Company are erecting a small battery, and the Golden Band and Golden Horn Companies are prospecting their properties, but the results have not so far been satisfactory.

Loose gold is obtained in the creek, and I understand that a syndicate intend working it by dredging.

#### WAIOMO DISTRICT.

*Monowai.*—This mine is being systematically and vigorously developed under the able management of Mr. W. H. Williams, a gentleman of large experience in America and Australia. The ore is of a very refractory nature, and for years past efforts have been made without success to extract the precious metals. Mr. Williams claims that he can successfully treat the quartz, and has overhauled the battery. The ore will be treated by wet crushing, amalgamation, and Brown and Stanfield's concentrators. The tailings will be treated by cyanide, and the concentrates sent to Europe for special treatment. If this treatment is successful a large and complete plant will be erected. There is a good supply of ore to grass, and the mine is so well opened up that no difficulty will be found in keeping a forty-stamp mill fully employed.

Professor Black has treated small parcels of the most refractory ore by his permanganate-of-potassium process, and claims that he extracted 94 per cent. of gold. In order to save the silver another treatment will be necessary. As a consequence of this discovery, several properties through which the Monowai reefs are known to run have been taken up.

In the Comstock Claim, through which one of the Monowai reefs runs, operations have been resumed, and a cross-cut to intersect the reef is being driven.

The Broken Hills Company are still prospecting their property, but the results so far have not been good.

Most of the mines in this district have been forfeited or surrendered.

#### PURU DISTRICT.

The Puru Consolidated Gold-mining Company (Limited) have been carrying on systematic works in opening up their mine and taking out quartz. A ten-stamp battery, water-race, and dam have been constructed. A considerable quantity of ore has been won, the assay results of which show it to be payable. The lode is still looking well. A new reef was recently discovered, giving at the outcrop an assay-value of £1 9s. per ton. It is intended shortly to cut this reef at some depth below for the purpose of ascertaining whether it improves as it goes down. This company deserves every success for the way in which it has carried on its operations. It is hoped that very soon the mine will repay what has been spent upon it.

Nearly all the other claims held in this locality last year have been abandoned.

#### TARARU DISTRICT.

The Tararu Creek Company has been continuously at work. The battery-level is being driven to make connection with the City of Dunedin level, which is also being pushed on with from the opposite side of Tinker's Gully, the intention being to connect these levels so that the ore may be sent through the mine to the battery direct. The other works in progress are prospecting, driving, and rising to connect with the low level. This company had the misfortune to lose its battery by fire on the night of the 25th March. At the time the plant was undergoing extensive alterations. Nothing daunted by its loss the company at once decided to erect new and more suitable machinery, and Messrs. Price Brothers are at present engaged in erecting a thirty-stamp mill with all necessary plant. A water-race has been constructed three-quarters of a mile long, carrying eight heads of water, and having a fall of 95 ft. The Pelton wheel, which will replace the old water-wheel, will drive the battery, air-compressors, and rock-drills. Judging from the work going on, the company must consider that the mine is payable.

*Chicago.*—A company called the Chicago Gold-mining Company was formed in Christchurch for the purpose of working this mine, and is engaged in opening up the property. Plenty of quartz,

said to be payable, is being found. A ten-stamp battery is being erected, and provision is made in the foundations for the addition of another ten heads when required. A water-race and tram-line are also in course of construction.

*Vulcan.*—The Thames Exploration Company, of London, have been developing this mine. There are several well-defined reefs—namely, the Scandinavian, Vulcan, and Nightingale—in the property. So favourable are the prospects that it is intended to erect a battery of twenty stamps.

*The Kaiser (The Kaiser Gold-mining Company, No Liability).*—This mine has been prospected vigorously, and the results are very encouraging. The main reef is being driven on, and an assay taken some few days ago, it is stated, gave favourable results. Hopes are entertained that a good run of gold will soon be met with.

*City of Auckland (City of Auckland Gold-mining Company, No Liability).*—This mine, formerly known as the Sylvia, has been prospected vigorously. A shaft has been sunk 170 ft. to the south-west of the low level, and it is intended to erect pumping and winding machinery in order to work the mine at a lower depth, underneath the place where the old Sylvia Company found good payable ore some years ago.

#### THAMES.

*Moanataiari.*—The Moanataiari Gold-mining Company (Limited) has been steadily engaged in opening up the mine and saving quartz for treatment. A considerable quantity of what is thought will prove payable ore is to hand. The battery has been completed, and commenced working last month. At present only thirty heads of stamps are going, but when the Cambria main reef is thoroughly opened the supply of ore which will be obtained from that reef, combined with that secured from the other parts of the mine, will, no doubt, be sufficient to keep the sixty stamps at work. A most perceptible improvement has taken place in the workings in the Golden Age reef during the last month. Developments in other parts of the mine are proceeding satisfactorily and with encouraging results. A full description of the mine appears in the report of the Inspector of Mines, so that I need not go into that here.

*Thames-Hauraki.*—The Thames-Hauraki Goldfields (Limited) has made good progress with regard to the erection of the new pumping plant at the Queen of Beauty shaft. The first set of plungers have been placed in position at the 327 ft. level, and the rising mains placed in the shaft from that point up to the surface, while preparations are being made to lower the pumping-rods. Work has been retarded by the non-arrival of certain parts of the machinery; in fact, so far as the high- and low-pressure engines are concerned, no more can be done until a further shipment of their parts arrive.

At the Deep Sinker section a chamber has been cut at a depth of 460 ft., and a cross-cut driven eastward for nearly 60 ft., and a start made from the far end in a northerly direction for the purpose of cutting the Una Hill reefs. A cross-cut will also be started shortly in a southerly direction, with a view to intersecting the Occidental, North Star, and Magnolia reefs.

Work has been suspended in the Deep Levels Consolidated section, pending the result of an action for cancellation of the license at the suit of John and Sarah Read, which will shortly be heard.

*May Queen Hauraki.*—The May Queen Hauraki (Limited) have been working continuously. The May Queen shaft has been enlarged and retimbered, and it is intended to continue sinking as soon as the Thames-Hauraki pumping operations commence, when the water will be drained from this part of the mine. It is thought that the sinking of this shaft will open up a block of payable ground. The results from the crushings have been encouraging, although not actually payable.

*New Alburnia.*—The New Alburnia Gold-mining Company (Limited) have steadily carried on work during the year. The shaft has been sunk to 100 ft. below the No. 3 level, making a total depth of 563 ft. A chamber has been cut here, and a cross-cut commenced. At a distance of 43 ft. the Dixon's reef has been met with, which is found to contain nice minerals. The old Sons of Freedom level has been repaired, and driving resumed from the Moanataiari side. It is intended to extend this level 300 ft. to get under the main shaft, which will be sunk 77 ft. more, in order to get on the same level as the tunnel. A considerable amount of opening-up has been done, and a large quantity of ore won has been treated at the company's battery, but the results have only been moderate. The manager is still persevering, and eventually hopes to meet with success.

*Kuranui-Caledonian.*—The Kuranui-Caledonian Gold-mining Company (Limited), which own this mine, have been engaged during the year in developing and prospecting works. In the early part of the year the prospects were of a very encouraging nature. The first crushing of 200 tons yielded 400 oz., but lately the returns have fallen off. The gas in this mine has been very troublesome, and on one occasion three men nearly lost their lives. The manager has invented a gas-alarm, which, when the gas arises to a certain height, rings an electric bell, and thus gives the alarm to those working in the levels affected.

*Waiotahi (Waiotahi Gold-mining Company, Limited).*—This company continues with much the same results as for the last fifteen years or so, obtaining payable monthly returns, and employing sixteen men opening out and prospecting. For some time during the year work was stopped for the purpose of repairing the shaft, overhauling machinery, &c., so that the total returns for the year have not been so large as usual. As the result of economical and systematical working the directors have been able to pay the twentieth dividend.

*Hauraki Golden Age.*—The Hauraki Golden Age Company (Limited) has had a large staff of men employed, and consequently a great deal of work has been done, but nothing of a payable character has been found. A twenty-stamp battery has been erected, and an aerial tramway constructed to convey the quartz from the mine to battery, but as yet very little use has been made of it.

*Victoria (Victoria Gold-mining Company, No Liability).*—This company has been at work steadily during the year, but with indifferent success. Lately the staff of men has been reduced.

*Cardigan*.—Five men are at work prospecting, but no return has been obtained. This mine is worked from the Saxon shaft in the May Queen property.

*Gloucester*.—The Gloucester Gold-mining Company (Limited) is prospecting its property vigorously. A considerable amount of driving has been done. A shaft is being sunk with the intention of driving under the Lucky Hit reefs. The works are being carried out in a satisfactory manner. A fair quantity of gold has been obtained from various leaders and reefs in the surface drives, and more should be found at the lower levels. The company intend erecting pumping and winding machinery, and is engaged in excavating for the foundations of a battery.

*Adelaide (The Adelaide Gold-mining Company, No Liability)*.—A large amount of work was done in the early part of the year, but, although a considerable amount of money was spent, nothing payable was found. The mine is under protection while the directors endeavour to collect calls with the object of continuing operations.

*Karaka Mine (Limited)*.—This property is well opened up and ventilated. The quartz found looks promising, gold being occasionally seen in the stone. It is intended shortly to erect a small battery.

Prospecting has been going on in the Lincoln, Manchester, and Karaka Queen with fair results.

*Fortuna*.—The Fortuna Hauraki (Limited) is vigorously pushing on with the developing works. Pumping and winding machinery have been erected on the shaft known as the Old Dart, and the water has now been pumped out. The low level in this section is being opened up with the intention of prospecting the ground at a depth.

*Ethel Reefs*.—The Ethel Reefs Gold-mining Company (Limited), formed in England lately for the purpose of working the Anchor and Kedge Special Claims, has been engaged in prospecting and opening the mine. Should payable quartz be met with the company is prepared to erect a new and complete crushing plant. A small four-stamp mill has been used for the purpose of testing the ore obtained from the various reefs. Twenty-four men are now employed.

Several other mines in the vicinity, such as the Mascotte, Limerick, Caledonia No. 2, and Victory, are being prospected, but nothing very promising has been found.

*Kirikiri Mines (Fleming's)*.—Prospecting has been going on, and good specimens obtained from the small leaders. So far no large body of stone has been found, but the prospects are sufficiently encouraging to induce Mr. Fleming to purchase the Day Dawn battery at Neavesville. This battery, consisting of four stamps and one berdan, will be removed from its present position to the mine. It is intended to drive it by a small gasoline-engine, water not being available. Mr. Fleming deserves every credit for the manner in which he has worked this property.

*Puriri*.—Empress of India: Operations are being carried on in this mine by Messrs. Bewick, Moreing, and Co. A good deal of work has been done, and forty men employed until lately. A quantity of quartz has been taken out and stacked ready for crushing. The prospects met with so far are encouraging.

*Puriri Gold Estates (Limited)*.—This company has spent a large amount of money in prospecting and testing the reefs which have been discovered, but, although good assays have been obtained, the bodies of quartz are not considered sufficiently large to warrant the erection of a battery at present.

*Pakirarahi*.—Nothing has been done in this district for some time. A great many of the claims granted have been forfeited, and several others are protected. It was thought that this district would prove a good producer, but I am afraid all hopes have now been abandoned.

*Tairua*.—Broken Hills: The New Zealand Broken Hills Gold-mining Company (Limited) have ceased operations pending instructions from the English directors. A large amount of work had been done, a battery purchased, water-race and tramway commenced, when it was found that nothing to warrant the erection of such plant had been discovered.

*Albert*.—The Albert Gold-mining Company (No Liability) has been working steadily prospecting, but nothing payable has been unearthed. The manager still has hopes of finding payable ore.

Considering that it was in this locality that such trouble arose between the prospectors (Gordon, Worth, and party) and the Kauri Timber Company, which, after a great deal of litigation, was arranged, it is strange that nothing has been done in the way of developing many of the claims granted. I am informed that the Anglo-Continental Syndicate have had a few men prospecting on some claims over which they had options, but have now ceased operations.

*Whangamata*.—The Whangamata Proprietary (Limited) have done a considerable amount of work on the Luck-at-Last Special Claim in prospecting and opening out the mine. A large reef was found, and has been well opened up. The quartz is payable, and some 5,000 tons are stacked ready for crushing. A contract has been let for the construction of a mill, and the excavations are now being proceeded with. A water-race is also being constructed. It is hoped this will prove a valuable mine.

*Wentworth*.—This mine is being developed by the Hauraki Peninsula Exploration Company (Limited), of London. Two reefs have been discovered, from which very high assays have been obtained, and are now well opened up. It is intended to erect a battery, and at present a water-race, tramway, and buildings are being erected.

Prospecting is going on in the Golden Mount and Golden Falls, but almost all the other claims have been either forfeited or surrendered.

*Ohui*.—The Maori Dream is now the only mine at work in this locality. This claim has had a lot of money spent on it in prospecting, but nothing payable was discovered.

*Great Barrier Island*.—The Barrier Reefs Gold and Silver Gold-mining Company (Limited) are engaged in opening up and prospecting Ryan's Freehold. It is said that the prospects met with are highly satisfactory. The Mount Argentum, Aotea, Kaitoke, and Edgerton Companies have done a lot of prospecting, and several reefs have been discovered, but as the ore is of a refractory nature it will require special treatment.

## OHINEMURI COUNTY.

Whilst the past year has not been so prolific in applications for special claims and licensed holdings as the two previous years, I am of opinion that more advancement and solid progress has been achieved than in any previous year. The gold returns from each mine for the year show a marked advance, a true sign of progress. New mills have started crushing, notably the Waikino battery (100 heads), Komata Reefs, Talisman, and Woodstock, and, as I predicted previously, this district has a future before it second to none in the colony. The evil effects of the boom of 1895-96 are gradually becoming effaced. Ground taken up during that period for purely speculative purposes has been surrendered and forfeited, and only those claims which are able to show something of value in them are being held for the purpose of being worked.

The district will now have a chance of proving its value, which must of necessity take time, as, although a great amount of genuine development is being done, the reefs continue principally low grade and need great care in treatment to prove payable.

Everything tends to show that the reefs are of greater value the more they are sunk on, this being proved most conclusively by the Crown and Woodstock Mines at Karangahake and the Waihi Mine at Waihi.

The wet-crushing process alluded to by me in last year's report as being in the experimental stages has been turned into a great success by Mr. Daw, the general manager of the Crown Mine, who has completely converted his battery into a wet-crushing one, which has enabled him to treat a greater tonnage than he otherwise could have done, reducing the cost of treating considerably, besides many other advantages. This success induced the Woodstock and Komata Reefs Companies to speedily follow suit. The Waihi also tried wet crushing with twenty heads for some time, but without much success. I hear, however, that they intend to give it another trial.

Lack of water to keep the big mills going at top speed during the exceptionally dry season just experienced, has caused a considerable amount of annoyance and inconvenience. The Ohinemuri River has never previously been so low at Karangahake, and the same remark applies to the Waitawheta Stream. Many batteries had to hang up half their stamps. There is not the slightest doubt that these companies will have to provide auxiliary steam-power if they wish to keep up their returns during the dry season.

The question of the future supply of timber at the present rate of consumption is also a difficulty that will have to be faced. It was lately given in evidence before me that the Waihi Company cut about 5 acres every second day. This, of course, is chiefly consumed in the roasting of ore. When it is pointed out that at the Waikino battery alone there are six large kilns in constant use, each holding 25 tons, it may be imagined that a considerable quantity of timber is required to thoroughly roast it.

The various mining townships are steadily growing. Each Court-day a large batch of residence-sites are granted. The Town of Waihi has assumed large dimensions, owing principally to the new 100-head battery starting work. To keep this going it was necessary to nearly double the number of men in the mine.

At Karangahake the business-sites have been so sought after that several quarter-acre sites in the main street, the rent for which is merely the annual business license-fee—namely, £3 per annum—have changed hands at prices between £700 and £1,000 each.

Roads throughout the county are in a very good condition, being well metalled to all the chief centres of population. Means of transit are therefore much easier than in former times.

Notwithstanding that a severe "slump" has existed all the year, being the natural reaction of the boom, the revenue derived from this part of the field has been greater than in any previous year, amounting to the sum of £12,000 odd. I may perhaps add that the County receive the major portion of this sum.

In the Karangahake district the leading mine is the Crown, which is under the able management of Mr. Daw. Great progress has been made during the year, and several large works undertaken. Twenty head of stamps have been added to the battery, whilst twenty more men are to be engaged shortly. The mine itself has been most systematically opened up, and a new level of 70 ft. below the level of the river has been started. The new underlay-shaft with its chamber is a splendid piece of engineering work, besides being the first of its kind in the peninsula. The big air-compressor, the largest in the colony, is working smoothly, and doing its work well. The water-race which drives the Pelton, which, by the way, is also the largest in the peninsula, carries thirty heads of water, is a mile and a half long, and has been entirely constructed during the year. I consider this mine has a splendid future before it, as it is being most economically worked.

The Woodstock Mine has hardly turned out as satisfactorily as was expected from its prosperous start. It has encountered a lot of hard luck. The ore, although assaying highly, is so refractory that it cannot at present be successfully treated. Mr. Harry Adams, of the Komata Reefs Mine, is at present trying his system for treating the ore, and five heads in the battery are under his control. He anticipates a successful issue and that he will be as successful as he has been with the Komata ore. Once this company manages to find a successful treatment certain prosperity awaits them, as there is any amount of ore in sight, some of it being almost as rich as specimen stone. The company, in common with its neighbours, the Crown and Talisman, have suffered severely through the dry season, and for a long time have been compelled to hang up half its stamps.

The Talisman Company has been very successful since it started to crush. The ore has maintained a uniform high value, and good returns have come to hand every month. The mine itself is being very well opened up. The battery, which is crushing "dry," obtains a good extraction, but it would appear that an auxiliary steam-engine is necessary during the summer months if good returns are to be maintained. Owing to this the Krupp mill, which is said to equal fifteen head of stamps, has only worked on rare occasions. I understand the company have in contemplation



the conversion of their battery to "wet" crushing if the experiments now being conducted in the Woodstock are a success.

The Talisman Extended are driving for a lode which is supposed to exist close to their eastern boundary. A good deal of prospecting work has been done in this mine.

The Victor Waihou Company, of which great things were expected, as it is supposed to carry the Talisman, Woodstock, and Crown reefs, has been closed down pending reconstruction.

The Woodstock Main Reefs Company has also closed down, having met with no success, after having done a lot of driving and prospecting work. The Stanley, Sterling, Waverley, Ivanhoe, and Excelsior Mines are all more or less protected, and have done but little work.

At Waitekauri, the big Waitekauri Company have shown considerable improvement in the output last year. The mine is now well opened up, and a large number of men are employed. Both batteries (dry crushing) are working smoothly. I understand that the Krupp mill has not been run during the dry season. In the Te-Ao-Maramara section of the mine the prospecting tunnel is being continued from both ends. Although nothing of importance has yet been struck the prospects are good.

The Alpha Company are now erecting their battery, which should be ready by the end of the year. The mine has been well opened up, and the lode assays exceedingly well. I hope to have something better to report of the company next year.

The Waitekauri Union Claims have accomplished a lot of prospecting and work of a preparatory nature, such as road-making, &c. No reefs to my knowledge have yet been struck. Although the ground holds a very good position for obtaining likely lodes it is difficult to say what the prospects are likely to be. A large amount of capital is being spent on this ground.

The Waitekauri United Company, I regret to say, has decided to shut down, as after carrying their low-level tunnel right through their property they struck nothing.

The Jubilee Company, which is one of the oldest mines in Waitekauri, and on which a great amount of work has been accomplished, have at last struck a better class of ore, which, although slightly refractory, assays well. They intend starting crushing with their ten heads of stamps in June. It is to be hoped that they will meet with some encouragement.

The Grafton and Grace Darling Companies have done prospecting and developing work. Both these companies should turn out good mines, but will need to start work in real earnest.

In the Komata the Komata Reefs Company has been very successful from the day they started crushing, at the latter end of last year. The ore has kept up a systematically high value, and a good extraction has been obtained. This company, I understand, intend to add an additional twenty head of stamps almost immediately, and other important works are also in contemplation, amongst which are putting in a low-level tunnel, 244 chains in length, through the Komata Reefs Extended Special Claim; also the constructing of a water-race down to Hubbard's boundary, transmitting the power by electricity. The mine now is well developed, and its prospects are distinctly good.

At Maratoto work is practically at a standstill.

The Waitekauri Extended Company, after spending a large amount of capital in constructing a forty-head battery, roads to it, water-races, tramways, &c., found a change of management was necessary, as the mine itself had not been properly developed to warrant such an expenditure. This is being undertaken by the management, and I understand experiments are now taking place in the battery to ascertain if it shall be run on the wet or dry process.

The Hikutaia Syndicate, in contradistinction to the last-mentioned company, have been fully opening up their property. Seven levels have been put in, and a large quantity of driving done on each of them; but the ore, which is plentiful, is so low grade as to hardly warrant the syndicate incurring the expense of erecting a large mill and water-races. To make this property pay it would be necessary to treat a large amount of ore per diem.

#### WAIHI DISTRICT.

The Waihi Gold-mining Company (Limited) have made great strides during the past year. Again it has put out a record return of gold for the year. Each year this great company increases its output, and it is expected for the year ending 1898-99 it will double the output of last year. Several important works have been finished, at a cost which must have run into six figures. The new 100-head battery at Waikino has been finished, and is now working as smoothly as could be wished. The two water-races to this battery alone cost £14,000. A new pump at the No. 2 shaft has been completed at great cost. This pump, I believe, is the biggest in New Zealand. It is capable of pumping 70,000 gallons an hour at a depth of 1,000 ft. It is at present only down 370 ft., and working at the rate of six strokes a minute. It can do nine strokes. The railway, of six miles, has also been completed. The company are now busy putting in two more levels at a depth of 370 ft. and 450 ft. respectively. Six hundred men are employed by the company, not including contractors, and the wages-sheet every month, excluding money paid to the contractors, totals up the very respectable sum of £5,500. The output per month, which is now close on £23,000, is expected to be increased to £25,000. The company have in contemplation the erection of another hundred head at Waikino as soon as the Union Waihi Company are in a position to take over the ninety-head battery at Waihi.

The Union Waihi Company are doing steady work, and have put down two good shafts. From the No. 1 shaft cross-cutting both ways is being carried on to cut the Amaranth reefs on the one side and the Union on the other. Before the former reef will be cut 640 ft. have to be driven. It is a big lode, but apparently only contains one main shoot of gold through it. Thirty men are at present being employed by the company.

The Waihi-Silverton Company have continued along steadily, their return averaging about £1,250 per month. In the new level opened up the ore shows slight improvement. It is quite

evident this company will have to sink to a considerable depth before big returns can be hoped for.

The Waihi Consolidated have sunk to a considerable depth in their shaft, but from what I can hear the ore is of very low grade. A considerable amount of work has been done. The company has had some difficulty to contend against with the water in the shaft.

*The Waihi Grand Junction Gold-mining Company.*—The Waihi Grand Junction and Waka sections: During the past twelve months an important discovery was made on this part of the Waihi Grand Junction Company's property. In cross-cutting north-west at the 500 ft. level of the No. 1 shaft a lode was intersected 411 ft. from the shaft. This lode gave out a strong flow of water, and proved its identity with the Waihi Company's lode system by the drainage from the Waihi Mine being immediately affected. There not being sufficient pumping-power available to deplete the lode a cement dam was constructed in the cross-cut to keep the water back until more powerful machinery was available. This is now on the way, in the shape of two Hornsby boilers of 138-horse power each (these are of similar type to Babcock's) and another pump with air-compressor and rock-drills. When this new plant is available the drainage of the lode will be undertaken. While waiting the aids to development a No. 2 shaft was started, and has been sunk 250 ft., and cross-cutting commenced. This work is an endeavour to locate the lodes above water-levels, but as yet with no tangible result.

Waihi, West Section: In this section the Martha lode was located 415 ft. south-east along the cross-cut from the 160 ft. level of the old shaft. The lode was poor at this level, and a winze upon it was started. This only obtained a depth of 16 ft. below the level when the water difficulty stopped the work. The effort, however, was successful in demonstrating that a few feet below the level the lode became payable, increasing in value as the winze got deeper. A new shaft, 11 ft. by 4 ft., was commenced from surface vertically over this winze, sunk and connected with it, and the sinking is being continued, with the intention of opening out at the depth of 110 ft. below the level. It is now the intention of the company to erect a mill upon this section, in close proximity to the workings; the proposed capacity of this mill to be 100 tons per day. Steps are now being taken with regard to securing a site and water for treatment. The average number of men employed for the last twelve months is thirty-seven.

The working capital of the company (£27,500) having become exhausted a reconstruction, providing a fresh working capital of £87,500 in a company of £200,000, was successfully carried through in December, 1897.

*Owharoa.*—The Ohinemuri Syndicate have not met with much success. In the shaft two reefs have lately been intersected, which assay well. The company, however, are unable to proceed further as the pumps have broken down, and until matters are fixed up nothing can be done. The Elliott tunnel has been carried through the property without striking anything. In consequence of this the company have thrown off the eastern side of their property and have taken in the Dawn of Hope and Teutonic Special Claims.

#### COROMANDEL.

Coromandel still continues to get good returns each month from several of its mines, most notably the now celebrated Hauraki, the Royal Oak, Kapanga, and now the Hauraki Associated Gold-mines Company comes up with a good monthly return from its special claim, the Pride of Tokatea.

Since my last annual report the Royal Oak and Tokatea Companies have completed the amalgamation scheme so strongly advocated by the general manager, Captain Hodge, and the results are, indeed, most satisfactory. The total gold already produced since August last is 9,702 oz. 4 dwt., of the value of £24,441 10s. 3d., thus enabling the company to declare a dividend of 3d. per share on its million shares. A new ten-head stamper-battery, complete with stone-breaker, &c., is being erected at the battery-site, and will be ready for use when the reserves are opened up on the Tokatea reef. The whole developments are being so concentrated that all the ore will be delivered from the No. 7 level to the battery. It is proposed to concentrate all the available water in the locality, at a cost of quite £7,000, in order to pump the shaft, work the battery, and to work rock-drills. When this is done this extensive mine will have every facility for working in an economic manner.

*Hauraki Mine.*—The powerful machinery for deeper development-work which was in course of erection last report is now completed and works admirably. The company's returns for year ending the 11th December, 1897, were £35,710 5s. 3d., from 11,793 oz. 3 dwt. of gold, thus keeping up a good reputation. The returns are not as large as they were, but with the new machinery and future developments great hopes are entertained of good results accruing from the lower levels. The value of last month's return was £1,277.

*Golden Pah.*—This licensed holding was part of the Hauraki Special Claim, but a new company was formed, and the Hauraki Special Claim subdivided, the Golden Pah Company taking over 18 acres 2 roods, on which has been erected powerful machinery for sinking and developing the ground. At the 130 ft. and 190 ft. levels a great deal of driving, cross-cutting, and general work has been done for developing and also for ventilating the mine systematically. A few small crushings have been obtained during the year, and profitable results are looked forward to from this mine.

On the Union Beach section of the Hauraki Special Claim machinery has been constructed and completed, the shaft cleared of water, and this part is now in full swing.

*The Kathleen.*—This company deserves to meet with success. An enormous amount of capital has been expended on machinery, &c., and prospecting done from the 200 ft. level. Numerous reefs have been met with, but so far have not proved payable.

*The Kapanga.*—The management of this mine has lately changed hands, Captain Hodge having been appointed manager. Good results are being obtained by several tributaries in this mine.

and last week the company itself had a crushing, valued at £240. The deep sinking has been discontinued at the present time, and the company is concentrating its work in developing and systematically working the intermediate levels.

*The Success.*—This company's ground is on the Karaka Block. The deepest workings so far are 275 ft. Good patches have been found in this claim from time to time. Continuous work is going on for developing and ventilating the mine with great hopes of payable results.

*New Hauraki.*—This company has done a lot of work on its ground, which is also partly on the Karaka Block. Enormous reefs are found, but the average ore so far has not proved payable.

*Scotty's.*—The main shaft is down 400 ft., and at this level a cross-reef has been met with and driven on, intersecting Brewer's reef. The driving is being continued north to come under the winze which yielded the rich patch of gold. The winze is the same depth as the level, and in a few weeks' time it is hoped to effect communication for ventilation. Driving will then be proceeded with to pick up this level.

*Hauraki Main Lodes.*—This company's property is the Albion Special Foreshore Claim, upon which substantial machinery has been erected, and is in full swing. The shaft is down 180 ft., and the water is lifted by a Tangye pump capable of raising 7,000 gallons per hour. A great amount of driving and cross-cutting has been done, and is still going on with hopeful results. It adjoins the Golden Pah Licensed Holding.

*Kathleen Crown.*—This adjoins the Kathleen, and is still continuing its work of development. Good machinery for this purpose has been erected and is at work.

*Blagrove's Freehold.*—Adjoining the Kathleen Crown. A lot of work has been done. A report of some gold being found in this mine is correct, I believe, but it cannot be worked on till some considerable amount of driving has been done to connect the workings.

*Hauraki North.*—Considerable work has been done during the year, and several crushings of payable stone have been made, but at the present time operations are suspended.

*New Golconda.*—This mine is now under the management of Mr. R. H. Harrison. A great amount of work has been done, and from present appearances it is hoped that this mine will soon come to the front.

*Hauraki South.*—A fair amount of work has been done in this mine. The machinery in course of erection last year is completed, and work is still going on, but nothing of any moment has been discovered.

*Bunker's Hill.*—This company deserves credit for the energetic manner in which the claim has been worked, and, being alongside the famous Hauraki Mine, it will seem hard after all the work the company has done if a good patch of gold is not struck soon.

*Welcome Find.*—This company has done a vast amount of work during the year. It adjoins the Hauraki Special Claim, and it is considered that a portion of the Hauraki main reef goes through this ground. Some payable crushings have been taken out during the year, and the work is still being pushed ahead.

*Hauraki Associated.*—This company owns the Pride of Tokatea and Orina Special Claims, and has spent a considerable amount of capital in developing its mines and constructing a battery, with the result that a good monthly return of gold is now obtained.

*Harbour View.*—Considerable prospecting has been done in this mine, and is still going on under the management of Mr. A. Kelso. Several pounds of good specimens have been obtained during the year.

*Golden Lead.*—This company has been working during the year, and has lately struck a promising reef, of which great hopes are entertained, as it is supposed to be the Scotty's reef.

*Britannia.*—This company has done considerable work during the year, but the mine has now been closed down, and all hands discharged.

*Four-in-Hand.*—This company has done good work during the year, and it intends to construct a battery to crush its own quartz. I believe the ground is now well opened up.

*Queen of the North.*—The prospects of this company seem to be encouraging, a fair amount of work having been done. Some tributes have been let in the mine.

At Port Charles there is nothing doing beyond a little prospecting by John McNeil.

At Cabbage Bay the Jersey seems to be the only company doing any work. It has lately had some crushings of a payable nature.

At Tiki the Progress Castle Rock, Pukewhau, and Royal Mint are apparently the only active working claims, and a large amount of work has been done on these claims. The want of a crushing plant is much felt.

At Manaia the British Fleet, Golden Hill, Hauraki Queen, and Little Minnie are the only claims apparently attempting anything, and I understand some English capital is being obtained to work the three latter.

Mining in Kennedy Bay district has fallen off considerably, and only a very few claims are at work.

*Pukemaukuku Block.*—This is Aitken's Freehold, on which prospecting is being done with a view to future active development. This part of the district has been very little worked.

*Empress.*—This special claim adjoins the Pukemaukuku Block, and several reefs have been discovered connecting with the Pukemaukuku, and good and payable tests have been made of quartz from this claim, but the want of a crushing plant near to the claim is much felt.

At Matarangi the Ocean View Extended Licensed Holding, the property of the Matarangi Company, is let on tribute, the tributers crushing their quartz at this company's battery and meeting with satisfactory results.

*Kuaotunu.*—The Mariposa Company has now absorbed the Try Fluke Company's mine and plant, and regular crushings give satisfactory results.

The Kapai-Vermont Company have a good claim, but seem to be at present in a woeful muddle.

The Maori Dream Special Claim came to grief a short time ago, being sold under warrant of distress.

The Irene Company has done a fair amount of work, but the special claim is now under protection.

*Great Mercury.*—This was the first licensed holding granted at Kuaotunu, and a good deal of gold has been taken out of it from time to time, but it has been worked by fits and starts, and not continuously; regular crushings have been more frequent of late.

At Mahakirau and Mercury Bay the mining has almost collapsed. Mr. T. H. Taylor has been most energetic in prospecting in this part, and deserves that his Great Marlow Special Claim should be a success.

The Colorado Licensed Holding is in full swing. Robert Fitzmoriarty and A. R. Rutherford are doing some prospecting work.

*Opitonui District.*—This is freehold property belonging to the Kauri Gold Estates (Limited). There are nine special claims of 90 acres each, and an enormous amount of capital is being expended in developing this part of the district. A good iron tramway has been laid between Whangapoua Harbour and the Opitonui Township, distant about seven miles, the trucks being drawn by a small locomotive. Extensive crushing plant is being erected, and as good prospects have been obtained a great future is looked forward to.

As I stated in my last report, a great want is felt by the Coromandel people of a proper public quartz-crushing battery for testing purposes, and I feel confident that many of the mines would pay if reasonable tests could only be made handy to the claims; but when the ores have to be sent to the Thames or Auckland the miners have to think twice before attempting even a trial crushing, the cost being so heavy.

On the whole, I may state that mining generally in the Coromandel district is in a very healthy state, and steady and persevering dead-work and prospecting is being vigorously carried on.

The large monthly yield of gold speaks for itself.

*Te Aroha Sub-District.*—The mining in this portion of the district is pretty well at a standstill, the Great Western and one or two of the Reid Campbell's properties being the only ones upon which any work is being done.

The future hopes of nearly all the claims in this part of the district are bound up in, and depend to a great extent upon, the success of the Rev. Mr. Campbell's treatment of the ores by the process which is about to be tested. A plant has been erected, and is nearly completed; a short time should therefore show whether the treatment proposed will be successful or not.

At Waiorongomai very little work has been done except at the tunnel, which is now in about 1,260 ft. The air-compressor for working the drills is practically complete, but the water-power is not yet available.

I am afraid, unless some process cheap in nature is discovered, there will not be much activity in mining in this locality.

The Under-Secretary, Mines Department, Wellington.

I have, &c.,

R. S. BUSH, Warden.

### No. 3.

Mr. Warden ROBERTS to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Tauranga, 29th April, 1898.

I have the honour, in compliance with instructions, to forward the returns required, and to submit the following report on the portion of the Hauraki Goldfield under my charge. This being the first report I considered it advisable to include a summary of the incidents connected with the opening of the field:—

Immediately after the area of the Hauraki Goldfield was extended as far as the Kaituna River, in the Tauranga County, a number of special claims were applied for on Crown lands adjoining the boundary of the block known now as Fleming's Freehold. Prospecting operations had been going on in the locality with intermissions during the previous twenty years, and, although many reefs had been discovered and worked upon, little or nothing resulted.

The boom of 1896 caused speculators to give a little of their attention to undeveloped fields, and there was quite a rush of prospectors to the Tauranga County. At the present time a number of special claims are held, but it is only on the following ones that any work is being done, viz.: Te Puke Gold Reefs (Limited). This company, although not actually registered at the time of writing, will, no doubt, be so very shortly. The property consists of 1,087 acres of private land, and was originally known as Lee's Thousand Acres, and later as Fleming's Freehold. The company has a nominal capital of £20,000 in 160,000 shares of 2s. 6d. each. A cash working capital of £2,500 has been provided, and as it is intended that the workmen should work for half cash and half shares the amount mentioned is equal to £5,000. Only about 300 acres of the 1,087 are considered to be auriferous, and five separate reefs have been located. The main lode, known as Fleming's reef, has been cut through in three places, two drives being at the 40 ft. level, where the reef is about 50 ft. through, and the third at the 140 ft., where the reef is 26 ft. through and more compact. Numerous assays and tests have been made, all tending to show that the ore is payable. Some portions of the stone are rich, and contain gold visible to the naked eye, but the greater portion is of low grade, the average from wall to wall being about £2 to the ton. The whole is free-milling ore, and it is expected that it can be treated for 11s. per ton. For the last three months only three men have been employed, and latterly work has been confined to the 7 ft. reef known as Palmer's. The other reefs have also had more or less attention, and all proved auriferous.

2—C. 3A.

Clark's Freehold adjoins the above to the north, and, as the name indicates, is also on private land. The property formerly belonged to Mr. Proud, but about two years ago was acquired by Mr. J. A. Clark, who all the time has kept one man and sometimes two men going. A 12 ft. reef was found some time back, and two drives were put in to cut it, one being 30 ft. and the other about 120 ft. An outcrop of nice-looking stone was found recently, and two drives, one of 23 ft. and the other of 40 ft., put in below. In the 40 ft. drive a great quantity of loose stone was found, and it is thought that the reef is close at hand. Assays from the loose stone gave good results, and the cutting of the reef is anxiously looked forward to. It is thought that Fleming's reef runs through this property into the Ben Lomond, and a drive of 50 ft. has been put in, but for the time being operations have been suspended in this drive. A second man is to be put on at once.

*The Te Puke Gold-mining Company (No Liability).*—This company originally held two areas of 100 acres each, first taken up under the names of the Golden Belt and Golden Butterfly, but have now reduced their whole area to about 50 acres, which includes a portion of the old Vermont Special Claim ground. This is the only registered company in this part of the district, the shares being sixpence, and on which calls have been made to twopence. Shortly after the formation of the company the services of Mr. A. Long were obtained as working mine-manager, and after prospecting for some time a run of loose gold was picked up. The gold is coarse and has the appearance of small nuggets, and by some is thought to be alluvial. This was a new development, and the company induced an old West-Coaster (Mr. Whitehead) to come and try what sluicing would do. Sluice-boxes were erected and a little was saved, but there was not sufficient wash-dirt. Since then Mr. Long has found a horizontal seam of what is locally termed cement. This seam varies in depth from 3 ft. to 8 ft. and is of considerable extent, running right through the hill. The lode contains gold of the nature mentioned before, and the general opinion is that it is payable. Anyway the cost of treatment will be very light. It is rather peculiar that while driving into this seam the first reef on the property was found. The reef is of very kindly looking quartz, about 3 ft. to 4 ft. wide, and gives fair dish prospects. It is the intention of the company to take out a couple of tons, both from the cement seams and quartz reef, and have a bulk test made at the Thames School of Mines.

Adjoining the three properties mentioned is a block of land named Waitaha, which is owned by Natives. This has been divided into three claims. The Sisters Special Claim is the centre claim, and is owned by Mrs. D. Asher and her sister, hence the name. During the first twelve or eighteen months Mr. David Lindsay and another had been working and a number of drives were put in. No. 1 drive is in 120 ft. and is now in good sandstone, a quantity of loose quartz having been met with while driving. No. 2 drive is in about 40 ft., but the mouth having fallen in work was suspended. No. 3 drive is in 42 ft. and is in sandstone. No. 4 drive is in 44 ft., and here a reef of about 5 ft. has been cut. The stone assayed £5 2s. 2d. per ton. About 18 ft. of the reef has been taken out and paddocked. A new reef has recently been found outcropping, and a drive is now being put in to cut it. The drive will have to be a fairly long one, but when the reef is cut there will be 450 ft. of backs.

*Ben Lomond Special Claim.*—This claim is to the east of the Sisters Special Claim, and is being worked by a syndicate, two men being employed on the ground. Operations at present are confined to opening out an 8 ft. reef, believed to be the No. 2, or Palmer's, in the Te Puke Gold Reefs Claim. The reef was struck with only a few feet of driving, and the stone gives a good assay return. There are two other reefs known on the property, but little work has been done on them up to the present.

*Patience Special Claim.*—This is the third in the Waitaha Block, and is considered by experts to be a first-class property, having on it a very large reef that can easily be worked. Mr. London, who holds the license, is now negotiating for a company to commence work, and it is expected that active operations will be prosecuted as soon as the winter months are over.

*Lady Jocelyn Special Claim.*—To the south of the Te Puke Gold Reefs Claim a claim was taken up under this title with great expectations, as a run of gold was followed up to a very large reef, which outcrops for some distance. For some reason no further work was done, and the ground remains idle. This claim is on private land.

*Cairngorm Special Claim.*—This claim is also on private land, the licensee being Mr. S. Crawford. The property lies to the south of Fleming's, and should be traversed by several of the reefs in the last-named claim. Prospecting has been going on for some time, and two reefs have been located.

*Tauranga and Kaimai (Borrell's Find).*—To the south-west of Tauranga, about eight mile distant from the town, a prospector named Borrell found loose gold in the small tributaries of the Ruangarara Stream, and an association was formed for the purpose of keeping the workmen out, and, if possible, of discovering the reef from which the gold was shed. After careful washings in the creek a drive was started under what was presumed to be a blow or outcrop, but nothing but the smallest stringers were found underneath. Trenching and pot-holing were next tried, and afterwards numerous other drives, and although quantities of loose quartz, some actually containing visible gold, were met with no reef has yet been located. Numerous assays of the loose stone have been made, some giving a value of £6 to the ton.

*Kaimai.*—Almost due south from Borrell's. A great amount of prospecting has been done. During last year no less than fifty prospectors were sent out by syndicates, but no payable reef has yet been discovered, although loose gold can be got from the sand in several creeks, and boulders of flinty quartz can be met with in many places.

*Ngapeke.*—Between Tauranga and Te Puke a number of Natives worked at mining for some time without success.

The Under-Secretary, Mines Department, Wellington.

W. H. ROBERTS, Warden.

## No. 4.

Mr. Warden ALLEN to the UNDER SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Blenheim, 9th May, 1898.

I have the honour to enclose you herewith my annual return for the Marlborough Mining District for the year ended the 31st March, 1898.

I have no special report to make concerning this district for the past year. A number of special, river, and terrace claims have been applied for during the past year, but, as most of these applications were not dealt with till nearly the end of the year, no work has been done on them. I am informed that some of the applicants intend to work their claims; therefore I hope to have a more satisfactory report to make at the termination of the present year.

Payable stone has been found in several places in this district, and experts from other districts have not hesitated to say that if such discoveries had been made in any other gold-mining district they would have been worked long ago.

Dr. McKenzie, who owns a very small dredge on the Wakamarina River, has succeeded in bringing payable gold to the surface. This, no doubt, has induced a few workers and many syndicators to put in applications for river claims.

I do not think that the question of the future welfare of a mining district should be decided by the presence or absence of applications for claims. My opinion of the value of this district has been formed long ago, and I see no reason to alter that opinion. There is no doubt that this is a district rich in minerals, and if the miners are not driven out of the district by the alienation of known auriferous country a discovery will, sooner or later, be made that will tend to bring a working population of miners and mining companies into this district.

I have, &c.,

J. ALLEN, Warden.

The Under-Secretary, Mines Department, Wellington.

## No. 5.

Mr. Warden HEAPS to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Nelson, 4th May, 1898.

I have the honour to forward herewith the returns for the year ended the 31st March last, for each of the sub-districts of that portion of the Karamea Mining District within my jurisdiction, and to report generally thereon:—

## NELSON.

The track from the Wangapeka-Karamea Saddle to the Crow River was hardly completed in time to produce any marked results this year; but now that facilities have been provided for getting on to the ground many may be expected to visit the locality early next spring who have previously found payable gold in the Crow River.

I have not heard that any fresh finds have been made in the neighbourhood of the Sherry, the Wangapeka, or the Baton. At the Sherry two water-races are in course of construction, and about a dozen men are said to be working on McRae's Run, Wangapeka, with fairly satisfactory results, but as yet there is no sluicing on a large scale commenced. Altogether about thirty miners find employment in this sub-district.

## MOTUEKA.

During the past year all the applications for special claims, representing an area of 700 acres, in the Mount Arthur district, which were referred to in my last report, have lapsed. As far as I am able to judge, they were taken up without due investigation on the part of persons interested, though doubtless in the near future means will be found of working this known auriferous country to greater advantage than it is being worked at present by the few miners engaged.

The mineral licenses referred to in my last report were granted for an area of 300 acres, for the purpose of working the asbestos deposits in the Upper Takaka Valley, in the vicinity of Mount Arthur. A strong company has been formed, who are about taking over the licenses, and already tenders are called for surveying a tramway-line from the deposits to ultimately connect with the tramway-line down the valley to the port at Waitapu; and I hear that a track is being, or is about to be, cut to connect with the Mount Arthur Track, and so obtain comparatively easy communication with Motueka and Nelson. I have obtained fine specimens of asbestos from the deposits. The quality is undoubtedly good, and the quantity is said to be assured.

## TAKAKA.

At the Bubu there are five parties working. Patterson and party are bringing up a tail-race, and expect when they reach their ground to get on to good gold. Whelan and party have a sluicing claim, which I understand pays well when they have water. Rose and party are also sluicing, but have to get protection during the summer months on account of the scarcity of water. Stewart and party were on good gold at the time a slip occurred and destroyed their workings and covered up their face. Cate and Son are said to be making small wages. The general impression about this locality appears to be that the ground is good enough to support a number of men, but water is scarce, and the workings consequently retarded.

At the Anatoki there are six or seven parties working in the bed of the river, but with poor results. Here, again, the difficulty of bringing water on to the ground prevents the terraces being sluiced.

At the Onakaka six licensed holdings have been applied for to work a mineral deposit thought to contain platinum, but samples submitted to the Government Analyst have not confirmed expectations.



## COLLINGWOOD.

Generally speaking, the mining outlook in this sub-district is still satisfactory, and much good work is being done, with successful results in some cases, and in others—which have not yet arrived at a paying stage—with considerable confidence of success in the future.

Since the 1st April, 1897, nine special claims and licensed holdings have been granted and taken up, making up a total of twenty-nine now held, embracing an area of 1,470 acres 2 roods 11 perches, besides which there are two coal leases, containing an area of 139 acres.

The Parapara Hydraulic Sluicing and Mining Company have during the last year been continuously mining on a reserve held by them and on Mr. Travers's private land—in one place with two nozzles playing on an open face, and in another with two elevators. An average of about fifteen men have been employed during the year, and good returns of gold are said to have been obtained.

The Collingwood Goldfields Company (Limited), which has taken over Messrs. Fell and Gilmer's leases at the Quartz Ranges and Golden Gully, has about fifty men employed. This company has erected a sawmill, and is cutting the timber for fluming the water from the Boulder Lake to the Quartz Range Claims. The timber will be taken to the commencement of the race on the tram-line (already constructed), a distance of four miles. Practically all the alluvial ground at the Quartz Ranges, which experts have pronounced payable throughout, is held by this company, which to all appearance has a successful future before it.

The Rocky River Hydraulic Sluicing Company completed bringing on the water to their claim at Rocky River, and have commenced sluicing. No returns are as yet to hand, but it is generally believed that the venture will prove successful.

The Johnston's United Mining Company is still at a standstill. Unfortunately, a bush-fire spread to and destroyed the company's battery and plant in February last.

A good deal of work has been done on the licensed holding held by Squire and Bray during the last year. The result so far has been somewhat discouraging, but Mr. Squire is still sanguine that he will yet obtain a good return for the capital expended.

Of the five dredging claims granted during the year, only two have been taken up; these are on the Aorere River. It is early yet to say what the present holders will do, but I think it is unlikely that the rich deposits the Aorere River is known to contain will remain much longer neglected.

The Taitapu Estates Company, together with the Pioneers of New Zealand and the Australian Gold Trust Company, have given employment to about a hundred men throughout the year on the Taitapu Estates at West Wanganui. The valuable battery imported last year by the Taitapu Estates Company has been got on to the ground, is erected, and crushing has commenced. The Pioneers of New Zealand, who have been prospecting on another part of the estate, have met with satisfactory results. From 20 weighed tons of unpicked stone crushed at the new Taitapu battery 65 oz. of retorted gold were obtained.

Messrs. Caldwell and Son are steadily working their coal lease at Pakawau, where they have a good seam of coal. Their output for the past year was 230 tons, but this will be greatly increased as soon as the lessees have put down a tram-line, now about to be constructed from the mine to the wharf.

There has again been a decrease in the number of miners' rights issued and applications made during the past year, but this, as I explained last year, must not be taken to indicate a decrease in mining, but rather that the miners are electing to work for the steady wages paid by the large companies in preference to working in small parties as heretofore with precarious results.

In conclusion, it is gratifying to be able to repeat what I said last year—viz., that the Collingwood district is practically free from unemployed, and that the ordinary population, as well as a large number of strangers, have found ample employment here during the year.

I have, &c.,

The Under-Secretary, Mines Department, Wellington.

WILSON HEAPS, Warden.

## No. 6.

Mr. Warden STRATFORD to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Westport, 13th April, 1898.

I beg to submit the following report upon that portion of the Karamea Mining District which is included within my jurisdiction :—

## WESTPORT.

The year just closed has witnessed a decided relapse from the excitement and activity that had existed for some time previously, and, as a consequence, most of the large mining areas then taken up have been forfeited or abandoned, the licensees having failed to comply with the conditions imposed. Very little prospecting is being done now in comparison with the energy displayed in this direction twelve or eighteen months ago.

A few mines are proceeding slowly but steadily with preparatory works. The General Exploration Company is employing a reduced number of men, both at Fairdown and Bendigo, and some time must yet elapse before gold is obtained in appreciable quantities.

The Britannia Company has been prospecting vigorously throughout the year, and has found payable stone in various parts of the mine. Some work has been done at the Great Republic Mine, Stony Creek, and crushing ought to be started at an early date.

About the only claim at Mokihinui upon which anything has been done during the past year is the Lady Agnes. A few men have been employed prospecting, and, so far as I can learn, they have not met with the success anticipated.

No further developments have resulted at Karamea, Oparara, and Cascade Creek, and none of the large areas recently taken up in these localities are being worked.

The Beaconsfield Mines, at Waimangaroa, have been acquired by an English company, and preliminary works have been recently put in hand. It will probably be twelve months or more before stone is being milled.

At Addison's the Golden Sand Company started crushing cement about December last. The first clean-up took place recently, and it is reported that shareholders express themselves satisfied with the result.

Besides the claims already mentioned, some three or four other companies have done a little developmental work, and this about exhausts the list of larger mining ventures launched during the last year or two.

The bulk of the gold produced in the Westport district still comes from Addison's, and is obtained principally from claims which have been worked for twenty-five or thirty years, in most instances, perhaps, by the men who took them up originally. Doubtless the experience acquired by these pioneers of the sixties has enabled them to command a measure of success which has been denied to many companies and parties who in later years have endeavoured to participate in the good things of the locality.

The proclamation of rivers and creeks in the district as outlets for tailings, when given effect to, will be a great boon to the gold-mining industry, and will assist materially in its development; in addition to which it will tend to lessen litigation—one of the most potent factors in retarding and crippling genuine mining enterprise.

The beach-combing branch of gold-mining is now almost a thing of the past, so far as the beaches north of the Buller River are concerned. Year by year they have gradually been getting poorer, and at the present time the few remaining miners so employed can scarcely be said to be making a living.

Taking a general view of the situation, it may safely be said that there will be a material increase in the yield of gold in this district within the course of a year or two.

#### LYELL.

Although in Lyell and the surrounding district the past year has not been so prosperous as previous ones a large amount of work has been progressing, and the district has now an appearance of stability, which did not exist even when the locality was in a more flourishing state.

The Dee Creek Gold-sluicing Company (No Liability) was formed to work an alluvial terrace near Della Vedovas. It has already expended about £1,500 in the construction of a dam and water-race. In about three months' time everything will be in readiness to start sluicing.

The Exchange Dredge, formerly known as the Cock Sparrow, has been actively engaged in the Buller River, near Three-channel Flat. The Cock Sparrow Company, being unable to work at a profit to the shareholders, sold the property to the wages-men, who have already paid off a considerable amount of the purchase-money out of profits.

At Lyell business is now almost entirely dependent upon the results from the Alpine Mine. For a number of years the United Alpine and Lyell Creek Extended Companies had been working the same reef in adjoining claims, and it was apparent to shareholders in both companies that amalgamation would result in increased economy and profit. Until recently it had been found impossible to arrange terms, but all difficulties were at length surmounted, and the desired amalgamation became an accomplished fact. The company now holds upwards of 154 acres of ground, and since the amalgamation a considerable amount of prospecting and other work has been done. A large quantity of stone is now in sight, and no doubt the battery will be kept constantly running for some time to come. This mine has now produced gold to the value of over a quarter of a million sterling, and has paid £74,266 in dividends.

The Tyr Connel Claim is held by four men, who have been working leaders for a long time past. Stone of good quality is frequently obtained, but it is limited in quantity, and scarcely affords adequate remuneration for the labour expended in mining it.

The old Cressus Mine and battery have been taken up again recently, and are being repaired and put in working-order.

The Kent, Surrey, and Middlesex are three special claims of 100 acres each, situate at the north of the Alpine holdings, and are now being actively prospected.

Following up the Buller River from Lyell it is found that most of the claims along the banks which were worked in the early days are now held by the Chinese, who are indefatigable in searching for the few pennyweights of gold left behind by their predecessors. There are, however, still some Europeans making a comfortable living from their own claims along the banks of the river.

At White's Point a gigantic scheme for the diversion of the Buller River is on the *tapis*, and two special claims have been applied for in that portion of the river which will be drained should the diversion be accomplished.

The Buller dredge has been working steadily at Fern Flat with satisfactory results. At present work is being carried on near the junction of Husband's Creek with the Buller River, and a wide face with a good depth of wash is being operated upon, giving highly payable returns. The company is now building another dredge a short distance up the river from the scene of their present workings. It is expected that the new dredge will treat double the quantity of wash that the present dredge does without entailing any increase of working-expenses.

Near Murchison the Matakita Gold-dredging Company have built a new dredge, and have recently launched it on their claim in the Matakita River. The work of removing the machinery from the old dredge to the new one is now in progress, and should shortly be completed.

At Maruia Mr. George Walker has taken up two special claims and a licensed holding, comprising about 70 acres of alluvial ground. It is intended to work these areas by ordinary ground-sluicing, and for this purpose a good supply of water is being brought in. There is a great depth of wash-dirt, and natural facilities exist for working the ground economically and on a large scale.



## CHARLESTON.

No fresh discoveries of any importance have been reported during the year. The sea-beach claims continue to be eminently productive, and have given a better yield of late than they had been doing for a long time past. At the Back Lead and Candlelight the miners depend chiefly on the county water-race for their supply, which has been very irregular for some months owing to breakages in the siphon. It is expected that repairs will be effected by about the middle of this month. Four batteries are at work crushing cement and giving satisfactory returns, and a fifth battery is in course of construction.

Only a few miners are now employed at Croninville. The shallow ground has been worked out, and the deeper ground cannot be profitably worked by small parties of men without capital.

At the Four Mile there are three special claims, of an aggregate area of 250 acres, held by a German syndicate, but very little has been done upon the ground beyond felling and burning the bush.

At Fool's Terrace a special claim of 52 acres has been taken up by A. M. Bourke. A tunnel has been driven 700 ft. and other necessary preliminary work carried out. If this claim proves a success other claims will doubtless be taken up in the same locality, which has not yet been thoroughly prospected. Two special claims have been taken up at Brown's Terrace, but very little has been done towards developing them.

On the south side of the Totara River, near the sea-beach, J. M. Powell has taken up a special claim of 26 acres of black-sand country. Six Government heads of water are being brought from the Totara River near Croninville, a distance of four miles.

At Brighton and Long Beach only a few miners are employed. Four beach claims are being worked, only one of them giving satisfactory returns. The terraces in this locality are also very poor—in fact, it may be said that they were practically worked out more than thirty years ago. Judging from present indications the prospects of a mining revival in Charleston and Brighton are not in any way encouraging; but, as the unexpected frequently happens in mining affairs, hopes for a brighter future are not altogether unwarranted.

I have, &c.,

The Under-Secretary, Mines Department, Wellington.

H. A. STRATFORD.

## No. 7.

Mr. Warden STRATFORD to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Reefton, 14th May, 1898.

I have the honour to forward to you herewith statistical returns for the year ended the 31st March last, and submit the following report on the Inangahua portion of the district under my charge for the same period.

The return of gold from the quartz-mines is small. 9,751 tons of quartz has been crushed, yielding 4,266 oz. of gold, of the value of £18,253. The yield of gold from alluvial workings amounts to 3,015 oz., of the value of £11,811.

From the opening of the district to the 31st March last 695,701 tons of quartz has been crushed, from which 489,608 oz. of gold has been obtained, representing a value of £1,915,979, out of which £593,468 has been distributed in dividends. The total amount of alluvial gold raised for the same period is approximately estimated at 134,687 oz., representing a value of £499,827. The total gold-production of the district is, as far as can be ascertained, 624,295 oz., of a value of £2,415,806.

The following table will show the calls, &c., made by various companies in the district during the year :—

Company.	Calls made.	Dividends.	Quartz crushed.	Yield of Gold.	Value.
	£ s. d.	£	Tons.	Oz. dwt. gr.	£ s. d.
Boatman's Exploration ...	292 10 0	...	...	...	...
Keep-it-Dark ...	...	...	3,282	1,031 12 12	4,098 4 0
...	...	...	*	25 6 16	101 3 2
No. 2 " South Keep-it-Dark ...	700 0 0	...	...	...	...
Al ...	...	50	56	175 18 16	715 14 1
Hercules ...	1,400 0 0	...	*	12 13 8	50 11 7
Golden Lead ...	900 0 0	...	...	...	...
Sir Francis Drake Syndicate (private company) ...	...	...	1,357	465 9 1	1,867 14 8
Big River ...	...	...	480	390 11 0	1,582 6 1
...	...	...	†	620 0 0	2,480 0 0
Cumberland ...	1,000 0 0	...	...	...	...
Dillon ...	3,166 13 4	...	...	...	...
Newhaven ...	100 0 0	...	...	...	...
Boatman's Sluicing Company ...	100 0 0	...	...	...	...
Wealth of Nations ...	...	...	932	186 15 7	749 0 0
Progress Mines of New Zealand ...	...	...	3,644	1,358 0 13	6,608 13 8
Inglewood ...	200 0 0	...	...	...	...
	7,859 3 4	50	9,751	4,266 7 1	18,253 7 3
Alluvial gold ...	...	...	...	3,015 0 0	11,811 0 0
Totals ...	...	...	...	7,281 7 1	30,064 7 3

\* 9 tons 19 cwt. concentrates treated conjointly by Keep-it-Dark and Hercules.  
by cyanide process.

† 3,970 tons tailings treated

I submit for your information the following account of the work done by the principal mines in the district during the year :—

#### BIG RIVER.

*Big River.*—During the past twelve months No. 6 level, which is the lowest level in the mine, being 930 ft. below the surface, has been driven to intersect the block of stone left underfoot in No. 5 level. After driving 270 ft. without striking stone an uprise of 60 ft. was put up to connect with the winze which had been sunk 90 ft. on stone. From the bottom of the winze a prospecting drive 150 ft. in length was driven along the track of the reef, which contained broken stone of good quality. A good deal of prospecting has been done on the low level, but unfortunately without success. A tunnel has been started from the shaft in a south-east direction with a view, if possible, of picking up the old block of stone worked so successfully some years ago. An intermediate level has been driven between Nos. 1 and 2 levels. After driving 100 ft. a small block of rich stone was struck, but it soon cut out again. This intermediate level is now being continued on a good reef-track, and payable stone may be discovered at any time, as at a higher level a block of stone worked yielded near 3 oz. to the ton.

The company sold a heap of tailings, containing about 9,000 tons, to a Mr. McDonald, of Johannesburg, for 8s. per ton. He erected a plant and treated the tailings by the cyanide process. He treated about 3,970 tons, and obtained gold worth £2,480. The company are now treating the remainder of the heap.

During the year 480 tons of stone has been crushed, yielding 390½ oz. gold, valued at £1,582 6s. 1d. The total output of the mine is 14,459 tons of stone, yielding 20,327 oz. gold, valued at £81,822 19s. 9d., out of which dividends to the extent of £40,500 have been declared.

#### MERRIJIGS.

*Cumberland Extended.*—The Cumberland Exchange and Success Companies were amalgamated in December last under the title of the Cumberland Extended. The operations of late, with the exception of repairs, renewals, &c., necessary to maintain good ventilation, have been of a prospecting character, with the object of proving the bottom level for a continuance of the stone worked in the upper levels. Since the formation of the new company the low level has been extended 211 ft. in a northerly direction, the ground driven through being of a promising character, carrying a reef formation, pug, slate, and loose quartz. It is considered that some little distance will yet have to be driven before the point will be reached where stone may be expected.

*Inkerman Combined Mines.*—At the new Inkerman workings on the western slope of the main ridge between Rainy Creek and Devil's Creek sinking the main shaft was proceeded with and 87 ft. sunk by the 15th April, making the total depth of the shaft at that date 423 ft. At this depth a chamber measuring 16 ft. by 11 ft. by 8 ft. was constructed, and No. 4 level was driven eastward a distance of 605 ft. From this level a drive north on a reef-track was produced for 125 ft., with a cross-cut to the west of 87 ft. To facilitate driving this level (which will ultimately connect with the low-level tunnel coming in from the other side of the range) a dam was constructed in No. 3 level, and all water accumulating from the old stopes and from surface percolation was stored behind it, a Tangye pump being employed to lift the water some 319 ft. to the surface. In the surface tunnel north and works (to the eastward of the main shaft) 504½ ft. of new country has been opened up, representing driving 383½ ft., a winze of 104 ft., and an uprise of 17 ft. The winze, stopes 53 ft., and a cross-cut of 34 ft. have been opening on stone. At the surface winze, north of Revival Gully, 46½ ft. has been sunk, 23 ft. driven, and 16½ ft. stoped; 63 ft. has been on stone.

In the old Inkerman Mine 818 ft. has been driven in new country and 212 ft. in sinking and rising, and of these distances 314 ft. has been opening on stone. To ventilate this portion of the mine an air-shaft was sunk 102 ft. and connected with an old uprise. The No. 2 Inkerman block has been driven on 75 ft. and a winze sunk on it 6 ft.

In the Supreme Mine 822 ft. has been driven and 147 ft. sunk; 514 ft. has been opening up on stone.

The Low-Level tunnel from Rainy Creek was commenced in February, 1897, and on the 25th March had been driven 2,089 ft. The first 221 ft. was driven by hand-drills and took twelve weeks, and the balance, 1,868 ft., was driven by rock-drills and took forty-six weeks, the respective averages per week being 18.41 ft. and 40.6 ft. The tunnel is ventilated by air-boxes which are worked by an exhaust with compressed air obtained from the receiver at the mouth of the tunnel. The power is obtained from a Cornish boiler situated at the battery, which drives a Rand air-compressor.

The total amount of ground opened up represents 6,157 ft. The average number of men employed for the year was sixty-five. For the fifteen months ended the 25th March last the company expended £11,324 in wages. This does not include amounts paid for contracts or official salaries. The company recently obtained six months' protection of their properties on the grounds that they had spent over £20,000 thereon and that such expenditure had exhausted the capital of the company and they required time, &c., to raise further capital.

*Golden Lead.*—The driving of the low-level tunnel has been proceeded with and it is now in 1,100 ft. Most of the driving has been through very hard ground. Better country, however, is now showing in the face. The tunnel will have to be driven another 160 ft. before it reaches the perpendicular of the surface lode and into the reefing country. This company has shown much energy under adverse circumstances.

#### CRUSHINGTON.

*Keep-it-Dark.*—The principal work carried out during the year has been the opening-up of No. 7 level. The total depth from the brace of the main shaft to No. 7 level is a little over 1,000 ft. The depth of the main shaft from the brace on the surface to No. 3 level is 486 ft., and from the

brace of the inside winding-shaft (which is 500 ft. from the main shaft on No. 3 level) to No. 7 level is 516 ft. A cross-cut 185 ft. in length from the bottom of the inside winding-shaft intersected the reef on No. 7 level. The reef has been driven on about 100 ft., and one or two stopes opened out to test the quality. There is a large body of quartz, but so far as operations have extended it is of low grade, yielding only about 4 dw. per ton. Stopping out stone has been proceeded with from No. 5 level upwards, on a continuation of the good block of stone which was worked during the preceding year, but the quality of the stone has deteriorated to such an extent that it is scarcely payable.

Prospecting operations on No. 1 level recently resulted in the discovery of a reef, which at the present time has been driven on a little over 40 ft., the stone in the face being about 13 ft. wide. A crushing of 100 tons of stone from this block has given 134 oz. of amalgam. This block is 500 ft. from any quartz hitherto worked in the mine. The new water-wheel for winding purposes has been completed and is working well. Three thousand two hundred and eighty-two tons of stone have been crushed during the year, yielding 1,032 oz. of gold, valued at £4,098 4s. A quantity of concentrates (9 tons 19 cwt.) was treated on account of this and the Hercules Company, and yielded a return of £151 14s. 9d. The total output of the mine is 125,512 tons of stone, which yielded 66,719 oz. of gold, valued at £259,753 5s. 8d., out of which dividends to the amount of £113,416 13s. 4d. have been given.

*No. 2 South Keep-it-Dark*.—Prospecting operations have been carried on in various parts of the mine, but without payable results. A cross-cut is now being driven west from No. 3 level with the view of intersecting the same line of reef on which the Keep-it-Dark is prospecting from No. 1 level. This cross-cut has now been extended 200 ft.

*Wealth of Nations Group*.—The incline shaft has been sunk 280 ft., making a total depth of 624 ft. A chamber has been cut for winding-gear, and also ore- and waste-bins. New rails have been laid down for 1,100 ft., and timber renewed. The 200 ft. level has been retimbered for a distance of 150 ft. In the 350 ft. level 320 ft. has been driven north on the track of the reef. In the 500 ft. level 64 ft. of driving has been done to the north on the track of the reef, and a chamber cut at the incline shaft, and 40 ft. of the drive has been timbered up. On the south block a rise of 30 ft. was put up to connect with the old stopes. In the old stopes between the 350 ft. and 500 ft. levels a considerable amount of work was done to secure the ground and put it in working-order. On the old Energetic side the old level had to be redriven and timbered a distance of 300 ft., and a drain cut in the 200 ft. level to take the shaft-water. A hoisting-engine, with compressor, &c., has been erected at a cost of £400.

#### MURRAY CREEK.

*Golden Fleece Group*.—This includes the Inangahua low-level tunnel and other properties. The low-level tunnel has been extended 1,485 ft., making the total length of the tunnel 5,285 ft. A cross-cut of 610 ft. has been put in, and a rise of 88 ft. was made to connect with the bottom of the winze sunk in the Golden Fleece to a depth of 380 ft.

*Inglewood Extended*.—This comprises properties formerly held by the Inglewood, Phoenix, and North Star. The Phoenix reef was worked down 150 ft., the Inglewood reef 350 ft., and the North Star 75 ft. The mine is under offer to the Consolidated Goldfields of New Zealand, whose property (the Golden Fleece) it adjoins, and that company would have facilities for working the reefs mentioned if they live down, as the Inangahua low-level tunnel if extended a comparatively short distance would go through the Inglewood ground and give a large height of backs. Gold to the value of £33,609 has been obtained from these reefs. Four men only are working in the mine, and they are having a small crushing put through the battery.

#### PAINKILLER.

*Dillon Extended*.—This company's operations have been chiefly confined to the work of extending the No. 2 level south in the direction of the high ground in what was formerly the old Dillon Licensed Holding. After rising and making the connection complete between this level and Lawn's winze from intermediate level, several contracts were let for driving the tunnel ahead, and since leaving that point 343 ft. has been added to the level. For the greater part of the distance a reef-track in very likely country has been followed, and at the present time the face shows a good formation with quartz leaders. At the end of January a body of quartz, varying between 2 ft. and 3 ft. in thickness and of payable quality, was struck. It lasted for a length of 30 ft., and as a well-defined track has been kept ever since the indications have been considered sufficient to warrant further prospecting at this part.

#### BOATMAN'S.

*Welcome*.—The work of developing the reef found in No. 5 level has been carried on. The rise on the southern end of the block was continued 167 ft., and a cross-cut put in 21 ft. to the west. The track was driven on for 32 ft., and this was risen on 35 ft. A cross-cut was put in about 50 ft. down the main rise, 13 ft. to the west, and the track driven on for 38 ft. The cross-cut from Eureka incline was driven 312 ft., but without success.

#### DEVIL'S CREEK.

*Progress Mines*.—The work of development has steadily been proceeded with. The sinking of the main shaft (Globe B shaft) was completed in August last, and cost £4,394. A Corliss winding-engine, capable of lifting from a depth of about 2,000 ft., has been erected at a cost of £7,432. The Otto aerial tramway, 6,796 ft. in length, has been completed at a cost of £3,064. A new forty-stamp mill has been erected and fitted with the latest appliances for economical working and saving of gold, including rock-breakers, automatic feeders, and vanners. The cost was £10,035. The water-race, ten miles and a half in length, and capable of carrying twenty-five

heads of water to work the mill, &c., has been finished, and cost £15,285. Chlorination works are now in course of erection. A very complete and interesting description of these works appeared in the *Inangahua Times* of the 9th March last, and was copied into the *New Zealand Mines Record* of the 16th April last, so that it is unnecessary here to refer to them further. A very large amount of work has been done in the mine. On No. 4 level 556 ft. of driving and 89 ft. of cross-cutting has been done. On No. 5 level 623 ft. of driving and 87 ft. of cross-cutting, and an uprise of 177 ft. put up to No. 4 level. In the intermediate level 110 ft. has been driven and 47 ft. of cross-cutting done, and an uprise of 183 ft. put up to No. 5 level. In No. 6 level 258 ft. has been driven and 560 ft. of cross-cutting. A rise of 106 ft. has been put to the intermediate level, and another rise of 244 ft. has been put up to No. 5 level. Two winzes have been sunk—one 21 ft., and the other (No. 7) 119 ft. On No. 7 level 738 ft. of driving has been done and 582 ft. of cross-cutting, and a rise of 17 ft. put up. This level has been connected with the main shaft. This represents a total driving of 2,285 ft.—1,365 ft. of cross-cutting, 727 ft. of rising, and 140 ft. of sinking. The mine has been well opened up, sufficient stone being developed, it is estimated, to supply sixty head of stamps for between four and five years. It was recently stated by Mr. Foster, the company's engineer, that he estimated the mine would return a profit of £28,526 a year, his estimate being based upon a return of 8½ dwt. per ton. The former owners of a portion of this mine—viz., the Globe and Progress Companies—crushed 135,793 tons of stone for a yield of 64,008 oz. of gold, or 9 dwt. 10 gr. per ton.

#### GENERAL.

The yield of gold from the quartz-mines has been small, but the current year should show an improvement, as the Progress Mines have started crushing with sixty head of stamps, and better returns may be expected from the Keep-it-Dark, judging from the appearance of the new reef in No. 1 level. About forty men are prospecting at Victoria Range, about twenty being employed by the Anglo-Continental Syndicate on the Kirwan's Reward properties. I have not heard of any discovery of importance, and am unable to supply any information concerning it owing to my inability to obtain it.

I have to thank managers of companies and others for information kindly supplied, enabling me to furnish this report.

I have, &c.,

H. A. STRATFORD, Warden.

The Under-Secretary, Mines Department, Wellington.

#### No. 8.

Mr. Warden STRATFORD to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Greymouth, 21st April, 1898.

I have the honour to submit my annual report upon the district under my charge, and at the same time to forward to you the statistical returns.

*Greymouth.*—No further developments have taken place in the cement claims at Rutherglen, the promoters so far have failed to induce capitalists to invest in them. As the wash, both above and below the cement, is said to contain gold in payable quantities for hydraulic sluicing it is confidently believed the claims could be profitably worked by bringing in a good water-supply for sluicing purposes, when the cement could be picked and stacked for crushing, and would act as an auxiliary to the sluicing operations. Along the south beach a few parties are getting a good living, the Leviathan Company alone winning over a thousand pounds' worth of gold during the past year.

*Dunganville.*—There is nothing new to report on this once one of the best gold-producing districts on the West Coast, but it is by no means worked out. A very large area of it will still pay for sluicing, but the difficulty is to get water at sufficient elevation to command the ground. I am told there is a possibility of the Hohonu Water-race Company shortly bringing water on the field. The few parties who own high-level water-races still make good wages, although they are only able to work in wet weather.

*Barrytown.*—Going north, the Old Darkies' Terrace at Point Elizabeth is attracting attention, and an attempt is about to be made to bring water on to it from the Seven-mile Creek. Special claims have been taken up at Ten-mile, and a contract has been let for the survey of a forty-head race to command the ground. At the Fourteen-mile the Pactolus Company are about to bring in a race to work the holding belonging to them.

The Barrytown Flat Gold-mining Company No. 1 have been pushing on their race from Baker's Creek as fast as circumstances would permit. The race is carried along a very steep sideling of slate-rock, and the strata is so shattered that the ditch would not hold water, so the channel had to be boxed the whole way. As there is no mill on the ground the timber was cut in Greymouth and rafted to the Seventeen-mile Beach. The heavy piping and machinery connected with the elevating plant or blow-up was conveyed to Barrytown in a punt specially built for the purpose. The transit was effected in three trips of about 60 tons each, the tug "Westland" standing by to tow the punt off when unloaded. Now that the timber and machinery are on the ground it will not be long before this enterprising company are at work. Further north, at Canoe Creek, the Barrytown Flat Gold-mining Company No. 2 have taken up a special claim of 100 acres and had a race surveyed from Canoe Creek (length, four miles and three-quarters) and the contract for the first mile has just been let.

The Waiwhero Gold-mining Company, floated in Christchurch, have also commenced operations, and are constructing a race to work the terrace ground. This company has erected a sawmill to enable them to cut timber for use in their claim and thus avoid the heavy expense in rafting and punting the same from Greymouth.

The prospects in this subdivision of my district are exceedingly favourable.

3—C. 3A.

## QUARTZ-MINING.

*Langdon's*.—With the exception of the Victory Mine owned by Curtis Brothers, which is steadily worked, no further steps have been taken to develop this field. One or two claims are still under option to English capitalists, but the prospecting that is being carried on is of the most superficial kind.

## PETROLEUM.

It is worthy of mention that Messrs. Neils, Mortenson, and party reported a discovery of crude petroleum in a swamp at Kotuku, near Lake Brunner, and applied for a mineral lease, but the Midland Railway complications have so far prevented the applications being dealt with.

## COAL-MINING AND TIMBER.

The Greymouth-Point Elizabeth Railway and Coal Company's bridge over the Grey River is all but finished, but pending litigation has prevented this company from completing the work in connection with the opening-up of their Coal Creek Mine. The output of coal from the company's Brunner Mine for the year was 85,592 tons.

*Blackball Coal-mining Company*.—The output of coal from this company's mine for the year was 43,000 tons.

*Timber*.—The total quantity of timber shipped from the Greymouth port during the year was 10,199,527 superficial feet.

Return of cases disposed of in the Magistrate's and Warden's Courts at Greymouth for the year ending the 31st March, 1898: Civil, 154; Criminal, 203; Warden's, 48.

The revenue for the year amounted to £3,155 16s. 6d., made up as follows: Warden's department, £2,927 18s. 6d.; Magistrate's department, £160 10s.; licensing-fees, £67 8s.: total, £3,155 16s. 6d.

Particulars of revenue collected in the Warden's Court, Greymouth, for the year ending the 31st March, 1898:—

	£	s.	d.
Miners' rights	315	0	0
Water-races	28	2	6
Registrations	24	12	0
Rents	1,352	8	0
Fees and fines	39	15	0
Miscellaneous	1,165	9	0
Business license	1	10	0
Machine-site and quartz-crushing	1	2	0
	£2,927	18	6

## AHAURA DIVISION.

*Blackball*.—The few alluvial sluicing claims in the vicinity still continue working with satisfactory results: The Roaring Meg sluicing claim at Upper Blackball has been recently floated as a company, and they are getting ready for sluicing on a very large scale. With a plentiful supply of water at a high pressure and 150 ft. of face with a little gold all through it the prospects of the company appear decidedly good.

## QUARTZ - MINING.

The range near the head of the Blackball Creek is a network of quartz reefs. One immense reef runs about north and south, evident for two miles on the surface, and numerous leaders run into it at acute angles, some of them being very rich. Although nothing adequate has yet been done in the way of exploration the development so far has clearly proven that rich deposits of gold extend right along the range from the Blackball to Moonlight. Very many special claims of 100 acres have been granted to different parties, but the work of exploration has been seriously retarded owing to the expense and hardships consequent upon the non-existence of roads or tracks; but this is now within measurable distance of being remedied, for the Grey County Council (with the assistance of Government) have undertaken the extension of horse-tracks to many parts which were previously inaccessible, and within the next few months these tracks will have been completed sufficiently to admit of the conveyance of provisions and tools at reasonable cost. Most of the parties interested in the various special claims which are situated on the range are waiting the result of the operations of the Cræsus Gold-mining Company, which has in hand the development of a reef, discovered by one Neilsen, near the summit of the Blackball Peak, which is upwards of 4,000 ft. above sea-level. They are said to have proved the lead to exist in a solid condition for several hundreds of feet along the surface, and have tested the lower depths by means of tunnels and a winze with even better prospects than obtain on the surface, and they have now 220 ft. of backs proved. That the best results are confidently anticipated by those connected with this property is evidenced by the shares being firmly held by those who have been associated with this enterprise from the first. The difficulties experienced in the carrying-out of an extensive work in a country like this, and the scanty means of transporting the necessary implements and provisions, have necessarily hindered the progress of the company considerably. Their battery is now in course of erection at the foot of the hill, near the left-hand branch of the Blackball Creek, from which the motive-power is derived for the working of the mill. An aerial tramway a mile and a half in length is all but ready for service in conveying the ore from the mine to the mill. Adjoining the Cræsus Company's property is a special claim known as the Poneke, on which a tunnel is being driven to cross-cut a lode which has been traced for a considerable distance on the surface. This tunnel has already been driven for upwards of 400 ft., but will need to be carried a

further hundred feet or so before the lode is likely to be met. On some of the adjacent claims, such as the Taffy, Red Lion, and Homeward Bound Companies, considerable surface-work has been carried out in prospecting with fairly successful results. The Garden Gully Company have done a lot of work in their holding, which is located in the Roaring Meg Creek. The surface stone is good, but up to the present they have failed to intersect the lode below the surface.

*Moonlight.*—There has been considerable prospecting for quartz during the past twelve months, lately by the Paparoa, Prophet, and Deering's Wonder Special Claim holders. The stone in the latter claim is about 2 ft. in width, and shows gold freely, but it has not been traced on the surface for any great distance. The Prophet Claim has a formation of quartz and slate 6 ft. in width, the stone also showing gold freely. A tunnel is being driven in each of these claims to intersect the formation at a lower level. The Paparoa Claim Company have been tunnelling for the past year, and have met with partial success, having intersected several small bodies of stone.

#### ALLUVIAL.

The claims at Healey's Gully are proving remunerative; the difficulty is the want of a sufficient supply of water. The whole supply on the fields, about thirty heads, is in the hands of the Great Republic Company, used by them during the day, and let to other claimholders during the night. This makes the working of the claims most difficult and expensive, and it has wisely been decided to erect a reservoir in the Roaring Meg Creek. The Montgomery Terrace Company intend bringing in a race from the Blackball Creek to work their ground. Its length will be four miles, and as the get-away for tailings is good the claim would appear to have every chance of turning out well. At Upper Moonlight there are still a considerable number of miners engaged in alluvial workings, who are getting fair returns, but the future of the place depends on the reefing country.

*Bell Hill.*—A few parties are still mining at Bell Hill, and a Christchurch company have brought in a race to work the licensed holding taken up by them. The company have had great difficulties to contend against, but judging from the appearance of the face they have good prospects before them.

*Half-ounce, Duffer's, Granville's, and Noble's Creeks.*—I have nothing new to report on these places. The creeks in ordinary weather carry very small supplies of water, and sluicing operations are in consequence much restricted.

*Orwell Creek.*—Here several parties of miners have lately taken up claims at McCoola Terrace. This terrace was rushed some twenty-five years ago, and a number of tunnels driven, some of which went right through the hill. In this locality the area of sluicing ground is large, but the supply of water is extremely limited.

*Ahaura.*—No new ground has been broken on the north bank of the Ahaura. The holders of those claims commanding a supply of water are obtaining remunerative returns for their labour. There is a large area of unbroken auriferous ground in and along the river which only requires a sufficient supply of water to provide employment for a large number of miners and to make the working of it a profitable undertaking.

*Nelson Creek.*—The population in this subdivision remains stationary. The claims at No. 2 terrace did not turn out as well as expected, although a few parties still remain on it tunnelling.

*No Town and Red Jack's.*—At present about thirty Chinese are working the bed of Red Jack's, and generally sluicing operations are being carried on extensively in these subdivisions. At Cronin's Terrace, Sunday Creek, the gold ran into very deep ground, too low to obtain levels for tunnels to work it, and the terrace had to be abandoned.

Generally speaking, I may say that alluvial mining in the Grey Valley remains about the same as last year, and no revival can be expected until some new schemes for water-conservation are matured and carried out on a large scale.

Return of revenue received at Ahaura for the period ending the 31st March, 1898:—

	£	s.	d.
Miners' rights	...	...	...
Registrations	...	...	...
Water-races	...	...	...
Fees and fines	...	...	...
Rents	...	...	...
Miscellaneous	...	...	...
	£1,572	14	5

During the year there were lodged 414 ordinary applications, twenty-five applications for special claims, and three applications for licensed holdings.

I have, &c.,

H. A. STRATFORD, Warden.

The Under-Secretary, Mines Department, Wellington.

#### No. 9.

Mr. Warden MACFARLANE to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Hokitika, 6th June, 1898.

I have the honour to forward herewith the usual mining statistics for the year ended the 31st March, 1898, together with the annual report on mining matters in the districts under my charge.

## HOKITIKA.

Notwithstanding an exceptionally favourable year for hydraulic and ordinary sluicing operations the returns of gold from Westland show little, if any, increase on last year's production. New areas require to be brought under operation, but, as this means a large outlay of capital and a considerable length of time before gold can be won, special inducements must be held out to parties willing to invest capital in such ventures. The time required for the development of a mine, even when the money is all in hand, is exemplified by the Humphrey's Gully Hydraulic Company's operations. This company have now completed the working survey of their large head-race, and will at an early date be calling for tenders for the construction of same. The Back Creek and Kanieri Lake Race Company have been for some time negotiating with a London company to finance a scheme for bringing a large supply of water on to Back Creek and Seddon's Terraces. This is one of the most promising fields we have, but they can only be worked by a large expenditure of capital. A number of the claims on these terraces are at present yielding handsome returns to the miner for ordinary drifting operations; but, instead of drifting, if a plentiful supply of water was available, the whole terrace would be sluiced away. The non-proclamation of the river as a tailing-site has a tendency to frighten capitalists, as they are afraid they might be subject to suits for damages, &c.; but a careful examination of the position will show room for at least ten years' tailing before they would touch the river. However, this matter should engage the serious attention of the Government, seeing that the non or wholesale working of all that line of terraces abutting on the Hokitika River for a distance of eight or nine miles will either mar or make the prosperity of Hokitika. A successful beginning has been made on Lake Mahinapua with the Kanieri dredge, which is now on payable gold in the bed of the lake nearly opposite Shanghai Point, and have traced the gold to the outlet of the lake. They are now down 12 ft. and still on golden wash.

Very little prospecting is being done in this district, and what little there is is mostly in the neighbourhood of old workings. The discovery of a body of blue cement containing quartz pebbles on the south side of Lake Kanieri, and yielding 5 dwt. to the load, may be of some importance, but not having seen it I cannot say what it is worth. On examination I hope to be able to report favourably. In this district we have six offices where applications can be lodged and titles registered. A miner can lodge his application at any one of the six: his claim may be in one of the sub-districts, such as Okarito, and yet his application may be dealt with in Hokitika, or *vice versa*. All this has led to endless trouble and litigation. To remedy this and prevent confusion I have, with the consent of the department, subdivided my district into five divisions—viz., Kumara, Stafford, Hokitika, Ross, and Okarito—the boundaries of each being set out on the map now being prepared by the Survey Department. One of the said maps to be hung in each office for the information of the public. All applications and registrations will then be dealt with in their respective sub-districts and in no other, unless under special circumstances.

## KUMARA SUB-DISTRICT.

This sub-district is fairly prosperous, the past year being favourable for sluicing operations, and in consequence of only a few stoppages in the water-supply satisfactory returns were in most cases obtained. To the north of the Teremakau, and on the Greenstone, the only change worth recording is the improvement in the races and dams of the Erin-go-Bragh Company. Owing to the improvements thus made this company now supplies a large number of claims along the Greenstone Road. O'Grady and party's special claim has been taken up by a Christchurch syndicate, and they are now busy with race- and dam-construction, preparatory to a more extensive way of working. First-class returns were obtained from this claim before it passed into the hands of the new company. It will be some time before the company will be in full work or in a position to prove the value of their property. Considerable improvements have been made in the methods of sluicing the ground worked during the year, but, notwithstanding this, several claims have been abandoned on account of non-payable results. Further prospecting has been done in the deep levels, and, although there are several claims now at work and paying small wages, no rich runs have been struck. On Kelly's Range a considerable amount of money has been spent in prospecting for quartz reefs by the Consolidated Gold-mining Company and others, but without discovering anything of value. Gold was found in several places, but nothing good enough, and there is now nothing doing on the range. On the Taipo a number of special claims and water-races were taken up in connection with an outcrop of serpentine. Gold of a payable character was said to have been found in this rock, which occurs here as a dyke formation. The tests made from the outcrop gave very good results, but samples taken at a greater depth did not show payable prospects, and it is just possible that the gold from the first tests may have been carried into the reef, as the Taipo, a gold-bearing river, crosses the outcrop. Anyhow, I understand work has been suspended, and the only special claims now at work are the hydraulic sluicing claims on the Seven-Mile. I believe at least one of them promises well, but results will not be known for some time. A good deal of money has been spent this last year in this block on surveys, rents, and prospecting with so far very meagre results.

## WAIMEA AND STAFFORD SUB-DISTRICTS.

The miners in the above sub-districts appear to be fairly well satisfied with the results of their year's work. The water-supply for the year has been exceptionally good, not only those supplied by the Government race, but also the miners working in the back gullies and on the hills above the race level, and the supply being fairly constant the gold returns were in keeping therewith.

The special claim known as the Wheel of Fortune is reported to be on good gold. The owner is said to be in England trying to raise more capital to work it in a more wholesale manner. A short time ago Professor Black visited the ground and, I understand, reported favourably on the venture. Whether the flotation of the company is an accomplished fact or that negotiations are still pending I am unable to say.



## WATER-RACES.

I am indebted to Mr. Aitkie, the manager of the Government water-race, Kumara, for information re races, dams, drainage-tunnels, and sludge-channels in the district.

The deviation of the Waimea Water-race at Kawaka has considerably improved the water-supply for the Waimea and Stafford districts, and the Wainihinihi Race, when completed, will still further augment it. In fact, after this race is completed the supply will be ample and constant. A survey of the race has been made, and it is anticipated the work of construction will be proceeded with forthwith. No stoppage in the supply occurred during the year.

The branch race to Callighan's has been made use of by a few parties during the year, and as there is plenty of unworked ground in the locality a more extensive use of the race-water may be looked for in the future.

The Middle Branch dams and branch race for the supply of water to the claims intending to sluice into the Waimea main tail-race have had very little done to them during the year.

The Waimea main tail-race has been completed with the exception of timbering the jump-up and one or two other small matters, and could with a very small expenditure be made use of at once. The delay in making use of this tail-race has been caused by certain financial difficulties, which it is to be hoped will soon be settled. The starting of sluicing in this main tail-race would give a great impetus to mining in this district.

The Kelly's Terrace drainage-tunnel has been driven about 2,600 ft., but no gold has yet been met with. A further distance of 4,000 ft. has yet to be driven before known auriferous ground will be reached.

The general supply of water for the year was all that could be desired, and I understand that the dams were empty only two days during the whole year. The increased capacity of the large dam at the Loopline Road has been a great boon to Kumara, as had it not been for this water would have been short on the field on several occasions for considerable periods of time. The completion of the Wainihinihi Race will to a large extent render the supply for Kumara independent of long periods of dry weather, and make it regular and constant.

The No. 5 channel is now drawing near completion in a satisfactory manner, and before another year expires several claims should be opened out and sluicing into it. The starting of sluicing into this channel should lead to a revival of mining in Kumara and a much greater demand for water.

In connection with the various channels and tailing-ground now used by the miners of Kumara, it is to be regretted that the spirit of litigation is so rampant with regard to the supposed rights of each party, when mutual concessions, dictated by common-sense, would overcome most of the difficulties that are now carried into the law-courts for adjudication, at considerable cost to all parties concerned.

## ROSS SUB-DISTRICT.

Mining matters in this district have not improved since my last report. On the contrary, what with the Ross United Gold-mining Company going into liquidation, consequent on the cancellation of a large portion of their claim for the non-payment of rent, &c., and the utter collapse of the company who took up leases on the Cedar Creek reefs the mining outlook is anything but encouraging. It has been said that the Ross United barred the way against capitalists, who would gladly have undertaken to put a suitable plant on the ground. This may or may not be truth. However, now it is open to any one having the capital to become possessed of one of the best mining properties in New Zealand. The grant is now held as a reserve by the Government, who, I understand, are prepared to grant liberal terms to any party who can show sufficient capital to carry out a plan of working the ground, to be approved by the Government Engineer. Nothing more is known of the value of the Cedar Creek reefs than was known years ago. They have been pegged and repegged, some expenses incurred, rents paid and due, but little or no work done to prove their value. In nearly every case the leases have been cancelled, and without outside help the people of the district can do nothing more. The Mont d'Or Special Claim is the one successful venture we can point to in the district at present. This claim continues to pay regular quarterly dividends to its lucky shareholders, and they have yet a large field before them. The only prospecting of any account being done is on the Totara River, where a North Island company have men at work testing the value of the river and valley gravels for dredging purposes. I am informed the prospects are eminently satisfactory, and the wash can be easily dealt with by the up-to-date dredges now procurable. This company are wisely proving their ground by sinking a series of paddocks before committing their shareholders to a large expenditure for dredging plant. The prospect obtained and the character of the material to be dealt with will, I think, justify the company in putting up a first-class dredging plant on the ground. A few men are prospecting on the Waitara River. This river and the Big Wanganui—two of our largest rivers, and both draining a large area of highly mineralised country—are practically unexplored, and would if carefully and intelligently prospected open up new and extensive fields for the miner.

## OKARITO AND JACKSON'S BAY SUB-DISTRICTS.

With the exception of the extensive works now being carried on by the Waiho Hydraulic Sluicing Company on the terraces between the Callary and the Totara Rivers, and the taking-up of two dredging claims on the Five-Mile and Gillespie's Beaches, there is nothing of importance to report. Considerable difficulty is being experienced by the contractors for the works on the Waiho Claim in getting the necessary material on to the ground. Seeing that over 120 tons of iron for pipes, besides a large quantity of other material required in connection with the claim, has to be carted over some twelve miles of very indifferent roads it is not to be wondered at if the roads made originally for the convenience of the settlers with their limited requirements should



be unable to bear the heavy traffic now put upon them. The County Council, whose duty it is to keep the roads in repair, are doing what they can with the limited revenue at their command to keep the roads passable, but it is a somewhat difficult task. The work in connection with this claim has brought a number of men into the district, and will for a considerable time afford them employment.

Owing to the unforeseen difficulties that have arisen in connection with the transport of material both by sea and land the actual working of this claim will be delayed some months beyond contract time. I understand it will be from four to five months before sluicing operations can be commenced.

The silver-pine-sleeper industry is employing a number of men, who are earning fair wages. Some 4,000 sleepers are now ready for shipment, and but for the unfortunate loss of the local steamer "Waipara," under contract to take the sleepers from the Okarito Wharf, this trade would have assumed larger proportions, a considerable quantity of this valuable timber being available.

Nearly the whole of the ordinary miners on the Waiho are preparing to undertake the working of the beaches of the Upper Callary. This can only be done during the winter months when the frost has dried up the river. If conditions continue favourable I expect to hear of some rich finds. A track has been made and a wire bridge thrown across above the gorge, giving easier access to what has hitherto been a very inaccessible place.

During this year some of the sea-beaches south have given very good returns, simply from what is termed beach-combing, thus showing that if the said beaches were dealt with in a wholesale and intelligent manner the results must be eminently satisfactory.

About two months ago McKay and Adamson crossed the divide from the Hermitage into the head of the Callary, ostensibly to examine the country for the quartz lodes that are supposed to have supplied the gold to the Callary and the Waiho, but as far as I can learn they did no prospecting, but simply made the trip across and returned by the Karangarua; so this interesting piece of country is still open to the spirited explorer. The mere feat of discovering passes and recording heights and other alpine features is not of much help to us from a miner's point of view, however interesting it may be otherwise.

In the far South matters are much the same as they were last year, the only important undertaking being a special claim on what is known as Sardine Terrace, near the mouths of Ship and Bullock Creeks. Prospecting has been carried on with very satisfactory results, and I understand that steps are now being taken to bring in some ten or twelve heads of water to begin with, which can be done at a very moderate outlay. Should the returns warrant a larger supply, this can be obtained by going back some six or seven miles, where an ample supply is obtainable. This is one of a series of terraces of great promise for wholesale hydraulic mining, and the success of this claim would mean the taking-up of many others. To the south of Jackson Bay, on the Olivine Ranges, and the block lying to the west of Cascade River nothing in the way of mining is being done, although this is one of the most promising districts in Westland. Owing to its inaccessibility the ordinary miner is still unable to get his supplies and tools with any reasonable hope of having time to do anything else. The track to Barn Bay is all that can be desired, but until it is continued some four miles further it is impossible for horses to get along. It would be very much in the interests of all concerned if this block were made accessible to the ordinary miner. The settlers on the Jackson's Bay Settlement would gladly avail themselves of the chance of supplementing their earnings on their holdings, besides being an open door for others who would gladly avail themselves of the opportunity. I trust the matter will engage the attention of the Hon. the Minister of Mines when the estimates for the tracks on the goldfields are being considered.

Owing to the unfortunate wreck of the steamer "Waipara" the whole of the southern settlements have been put to considerable inconvenience through want of communication. In Okarito especially goods had to be carried overland, causing a rise in prices from 50 to 100 per cent. At present there are some ninety bales of wool and 4,000 sleepers awaiting shipment, and in consequence the settlers and miners are put to great inconvenience and expense, otherwise the South is in a fairly prosperous condition.

I have, &c.,

D. MACFARLANE, Warden.

The Under-Secretary, Mines Department, Wellington.

## No. 10.

Mr. Warden HAWKINS to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Lawrence, 9th May, 1898.

I have the honour to submit herewith the annual statistics of the mining industry in the Tuapeka district for the year ending the 31st March, 1898, and the following report of the various centres for your information:—

The mining enterprise throughout the whole of the district has been fairly active during the year. Several dredges have been built and are at work, and others are being built.

The licenses for twenty-eight special claims and six licensed holdings have been taken up during the year, and 300 miscellaneous applications were dealt with.

### TUAPEKA.

There are now three dredges at work on the Tuapeka Flat: (1.) W. Murray and party on special claim near the Chinese Camp have done fairly well, and the owners are said to be satisfied with the undertaking. This dredge is lighted with electric light. (2.) J. Harris and party, known as the Tuapeka Flat Dredging Company: This dredge has stopped work for a great part of the year on account of the owners deciding to change the boiler, and there has been great delay

in getting another out from England. (3.) James Henley and party: This dredge has only just started. The locality was a rich one in the early days, and it is very probable, if properly worked, that it will give satisfactory returns.

The Evans Flat Dredging Company and the Tuapeka Dredging Company are each constructing a dredge to cost about £2,500. It is expected that the latter will be in working-order in about ten days and the former in about a month. Mr. Cullen is the consulting engineer for the building of these dredges, and they are being fitted up with all the latest appliances, and are being lighted with electric light at a cost of about £60. The engines and boiler have been imported, the makers being Messrs. Marshall and Sons, of Gainsborough, England.

Three other special claims have been taken up on the Tuapeka River below the above with the object of putting dredges on.

#### WEATHERSTONE'S.

The dredge owned by Mr. J. W. Robertson in this locality has not been working satisfactorily. He has had much broken time, and as yet it does not appear to be a success. The only other claim which I need mention in this locality is that of Messrs. Smyth, Adams, and Donlan, known as the Golden Rise Mining Party. They have increased their area during the year, and now hold a special claim of 73 acres. They have an elevating plant, and have been working steadily with satisfactory results.

#### BLUE SPUR.

The Blue Spur and Gabriel's Gully Consolidated Gold Company (Limited), under the able management of Mr. J. H. Jackson, have been working steadily for the year, and have won 3,163 oz. of gold, valued at £12,482. This claim is the mainstay of the Blue Spur Township, giving employment to a large number of men—viz., about forty-two—and owing to the company having an excellent water-supply they are enabled to make good time.

The Local Industry Gold-mining Company, in Gabriel's Gully, worked steadily for a great part of the year; they won 270 oz. of gold and paid a dividend of 1s. per share.

Messrs. J. Kitto and party have been working with a good supply of water for the greater part of the year, and the results are stated to be very satisfactory.

Messrs. Mills and Browne, at the foot of Munro's Gully, have an elevating plant with good pressure of water. They have increased the area of their claim during the year, and now hold a special claim of 46 acres. They are reported to be doing well.

#### TUAPEKA MOUTH.

The dredge that was working on what was known as Watts Goodwin's Claim at the mouth has been sold on account of some difficulty in working the ground by means of dredging. It is stated that the claim would pay well for sluicing if water with a little pressure was available. The dredge is now erected on Messrs. Henley and party's claim on Tuapeka Flat.

A dredge has been recently put on to Messrs. McLeod and party's claim at the mouth, having been brought down the Clutha River for the purpose, and I understand the returns so far are considered satisfactory.

#### WAITAHUNA.

Several special claims and other mining rights have been applied for and obtained in this sub-district during the year, but no new finds have been reported.

The Waitahuna dredge continues to work on the river-flat below the township, but I am informed the average returns are slightly below the previous year. It is now owned by McKenzie and party.

*Waitahuna Gully.*—Messrs. Thomson and party (the Norwegian Claim) have been working continuously during the year, employing about a dozen men, with fairly good results.

Ferris and party have been working on their licensed holding with good average yield.

The Sailors' Gully Gold-mining Company (Limited), after going to considerable expense in enlarging water-races, laying down pipes, and constructing dams, have now been sluicing for some months. They have had fairly good returns, and are confident that the claim will turn out satisfactorily.

Messrs. Hagan and party, and Quilter and party, are still working the old tailings in the bed of the gully, and owing to the wet season most of the claims in this locality have been able to turn over during the year a considerably greater quantity of stuff than last year, and therefore it is reasonable to expect that they have had a better yield of gold.

*Canada Reef, Table Hill.*—A special claim has been taken up here by John Lawson and party. They have about a dozen men employed opening out the reef.

*Burnt Creek Quartz-mining Company (Limited), Table Hill District.*—This claim is situated about fourteen miles from the Waitahuna Township. The company have a considerable body of stone opened up, and expect to commence crushing very soon. The crushing-machine consists of ten head of stampers; the battery is driven by a turbine, and the water-supply is by race from Tokomairiro River.

#### GLENORE.

Dredging is pretty well the only form of mining carried on in this locality, and there are three dredges at work on the south branch of Tokomairiro River:—(1.) John Nelson and party: This party have put in a new boiler, imported from England, during the year, at a cost of about £400. They have been working steadily during the year, and are reported to be on payable gold. (2.) Messrs. Tulloch and party: Working steadily during the year, and are on payable gold. (3.) Messrs. Robertson and party: This party have built a new dredge during the year; it is lower down the river, below the township; it has been working for about three months, and is reported to be doing well.

## MANUKA CREEK.

Messrs. J. D. Stewart and party : This party hold a large area under extended claims, and have done a lot of work in bringing in additional water, constructing dams, and opening up the claims. The situation being at a high altitude the water-supply during the summer is not very good, but during the rest of the year the party is of opinion that the returns will be satisfactory.

## WAIPORI.

The mining enterprise is still particularly active in this sub-district. Numerous applications for special claims and other mining rights have been dealt with during the year.

The O.P.Q. Gold-mines Company (Limited) was floated on the London market during the year, and took over the O.P.Q. Reefing Claim from the New Zealand Minerals Company. About thirty men have been employed during the year sinking shafts, erecting battery, and endeavouring to open up the reef.

The Amalgamated (Waipori) Deep Lead Gold-mining Company have made a fresh start. The mortgagee (Mr. Farrell), having purchased the property, is preparing to work the claim in a systematic way.

The Success Gold-dredging Company (Limited) took over a special claim of 84 acres from William Hanley, and built a dredge on it at a cost of £2,900. It has been working since January last, and the directors are well satisfied with the results so far.

The Empire Gold-dredging Company (Limited) is a company formed during the year, which took over the special claims of Messrs. McKinlay and Pilling. The claim is situated on the Waipori Flat. The dredge is now built, and will be working shortly. It is well equipped with all the latest appliances, and reflects great credit on the contractors, Messrs. Morgan and Cable, of Port Chalmers. The dredge will burn Westport coal, the only one in the district doing so.

Messrs. McNeil and party : The dredge on this claim is now entering on its second working year. The company is a private one, and the returns are not published, but I am informed that they are exceedingly good.

The Jutland Flat (Waipori) Gold-mining Company (Limited) has been working steadily for the greater part of the year, and has won 1,151 oz. of gold during the twelve months, and dividends amounting to £1,875 have been paid.

The Upper Waipori Alluvial Gold-dredging Company (Limited) has also been working for the greater part of the year. The yield of gold was 1,169 oz. Dividends declared amount to £600 for the year.

The Bakery Flat Sluicing Company (Limited) had some bad luck at the commencement of the year in opening up their new claim, but they have now got it in good working-order, and the returns are said to be satisfactory. A recent washing-up of the company yielded 71 oz. for the month. The claim includes all the available river-flat above the well-known Jutland Flat Dredging Claim. During the year an attempt was made to reach the main bottom of the gutter which underlies the false bottom on which operations are carried on, but without success, for after sinking 51 ft. from the surface the plant was withdrawn.

## TAPANUI.

Very little mining in this part of the district has been going on during the year. Only one dredge is now at work on the Pomahaka River, and the owner reports that he is getting gold in payable quantities. A few miners in the Waikaka and Greenvale districts are said to be doing fairly well. Edge and party are working their licensed holding taken up about a year ago, and I believe their prospects are fairly bright.

## WAIKAIA.

The mining industry in this locality has been very active during the year, and the business in the Warden's Court has considerably increased. The following statement of revenue collected at Waikaia will give an idea of the amount of work transacted in the Court for twelve months ending the 31st March, 1898, viz. : Warden's Court, rents, miners' rights, &c., £605 5s. ; Warden's Court, fees and fines, £8 15s. 6d. ; Magistrate's Court, Civil fees, £19 3s. ; Magistrate's Court, criminal fees and fines, £36 13s. : total, £669 16s. 6d.

There were 210 ordinary applications received and twenty-six applications for special claims and licensed holdings; thirty-two objections to applications were heard, and fifteen suits were entered in the Warden's Court.

There are about two hundred and seventy Europeans engaged in mining in the district, and about fifty Chinese.

The local bank has purchased about 2,090 oz. of gold during the year, and as all the gold found at Nokomai, Upper Waikaia, and Whitecombe districts, which would yield at least 700 oz., is disposed of at other centres, the total yield for this district would be about 2,790 oz., valued at about £10,900. This estimate I believe to be well within the yield.

The following are the principal claims at work in the district :—

The Argyle Hydraulic Sluicing Company have obtained 996 oz. of gold during the year from their two claims, although one of the claims was shut down for three months for want of sufficient water to work their hydraulic claim on Winding Creek.

The Waikaia Gold-mining Company, on Scrubby Terrace, obtained 206 oz. of gold for the year, which must be considered a good return, seeing that the company were only able to work for about six months of the year for want of water.

The Sew Hoy and Kum Poy Claims at Nokomai have also been short of water, and there are now about forty men employed in cutting another water-race, and when completed it will enable them to work at all times.

Messrs. Erskine and Thompson have sold their claim at Nokomai to a company called the Lion Gold-mining Company, which has now about thirty men employed in cutting a water-race from the Roaring Lion Creek to work the claim.

A company called the Otago Syndicate (Limited) have taken over the mining property of the Switzers Freehold, and all the claims of Messrs. Kennedy, McArthur, and party at the Winding Creek. They have about three hundred men employed in constructing water-races and working the claims. The water is to be brought in from the Liethan and Waikaka Streams, but owing to some difficulty with the contractors it is probable the work will not be completed for some time. The estimated cost of construction will be about £10,000, but when the races are completed there will be sufficient water to enable the company to work about nine elevators at once.

The Golden Crown Dredging Company have during the year placed a dredge on the Waikaka River at a cost of £3,500, but so far they have not been able to get on to payable gold.

A movement is on foot to have the Waikaka River declared a sludge-channel, but it is not known how far its promoters have obtained the support of the mining community.

#### WAIKAKA.

There are two dredges at work on payable gold in this locality; one is owned by Mr. J. R. Perry, and the other by Messrs. W. McGill and party. A few other special claims have been granted, and a number of applications are pending.

There is evidence of increased activity in matters relating to mining in this locality.

I have, &c.,

ROBERT S. HAWKINS, Warden.

The Under-Secretary, Mines Department, Wellington.

#### No. 11.

Mr. Warden DALGLIESH to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Naseby, 20th May, 1898.

In submitting the accompanying annual statistics of the mining industry for the Mount Ida district for the past year I have the honour to state that the period under notice has been marked even more acutely than ever by the scarcity of water, preventing, in a measure, the successful continuance of the works in progress at the various centres, causing, indeed, a state of comparative stagnation throughout almost the entire district. It is most satisfactory to notice, however, that despite the long and repeated disappointments in that respect, which have been met on all sides with great patience by the miners, they are still showing a determination to face their difficulties with the courage and energy so characteristic of the gold-miners of New Zealand; and the intimation given of the determination of the Government to proceed with the work in connection with the proposed reservoir at Eweburn has given rise to feelings of the utmost satisfaction and increased hope with regard to future supplies of water. A certain amount of prospecting has been carried out, which promises to bear out the predictions contained in some of my former reports—that independent of the ordinary sluicing and elevating works now in operation there is within the Mount Ida district a large area of ground which will be found remunerative for steam-dredging purposes. In this connection I may mention the Main Gully at Naseby, where there are now several elevating plants at work giving very excellent returns. One steam-dredge of large capacity is in position, and, I am informed, giving excellent returns in the meantime and indications of future prosperity. Several other dredges are to be constructed for the same locality as soon as possible, but delay in this matter is an enforced necessity, arising from the fact that all the builders of dredges in Otago are fully occupied on contracts, which will prevent the immediate construction of those contemplated for this part of the field. The one now at work belongs to the Naseby Dredging and Hydraulic Sluicing Company (Limited), is of large capacity, and reflects credit on the company for their spirited enterprise in placing, in addition to their two elevating plants, so complete a dredging plant on their claim. It is 70 ft. in length by 25 ft. 6 in., very strongly built of hardwood and kauri. The ladder is 45 ft.; the buckets have a capacity of  $3\frac{1}{2}$  cubic feet; the full lifting-power when running full being equal to 90 cubic yards per hour. The engines and boilers are very superior—20-horse nominal power, indicating up to 38-horse power actual. Altogether, the dredge and machinery are most creditable both to the company and the makers. There are two steam-dredges at work at the Upper Kyeburn; they are both obtaining gold, but in what quantities I have not been informed. Both of them have been used in other localities. One is, I fear, too small for the class of wash to be operated on, it requiring a large and modern dredger capable of treating very large quantities of ground, which, however, is comparatively shallow, and a dredge sufficiently powerful would, perhaps, entail a larger expenditure than would be warranted on the amount of ground now held under one lease. It is becoming a question of some moment whether in these shallow localities where manipulation is so easy in comparison with what has to be encountered in the deep and rapid rivers elsewhere, and large areas can so soon be worked out, it will not be necessary to increase the holdings for this special class of mining, which appears likely soon to become the mainstay of mining in this district. Every encouragement will have to be afforded those contemplating embarking capital therein. In any future mining legislation I consider this subject worthy of every consideration.

The ordinary mining work in the vicinity of Kyeburn has been carried on as well as possible during the year, and, excepting the universal complaint as to water being so scarce, I believe the returns have not shown any material alteration. At Hyde and Macrae's matters have altered but little if any since my last report. About the same number of miners remain, both European and Chinese. The Taieri Gold-sluicing Company have carried out extensive works and introduced a

4—C. 3A.

capital plant on their claim at a large cost. Unfortunately, the company has not yet been able to get started to work, but the prospects are, I am informed, quite satisfactory. In the old workings at the back of the Township of Hyde a shaft has been sunk to a depth of nearly 50 ft. below the old bottom, which had been worked to a depth of from 60 ft. to 80 ft. by the former workers. On the bottom of the new shaft a very good prospect was obtained—namely, 2 dwt. to a dish—but the amount of water found at that depth entirely precluded any further prospecting being carried on. The opening-up of this deep ground has been the ambition and hope of miners here for many years, and the prospect now alluded to appears to be pretty convincing proof of the existence of a highly payable strata at the depth named. The present shaft has been sunk under very great difficulties and positive danger. McBride and his partner have displayed energy and courage in carrying out the work to the extent they have. I may mention, in connection with this matter, that I recently met a deputation of the miners engaged in this undertaking and visited the works. There is no doubt it is a subject of great importance to the Hyde portion of the district to secure the exploitation of this ground. The majority of the miners in that locality, however, are not in pecuniary circumstances which will enable them to carry out the necessary works without assistance. The present project is to take advantage of an old cut by deepening and cleaning it out and then drive a tunnel sufficiently deep to carry off the water and enable them to work the ground for some 160 to 180 yards to strike the wash found in the shaft they have sunk. I was informed by a deputation of miners that the scheme is to be submitted for the report of a competent engineer, and probably some aid from the public funds will be applied for. So far as I can judge, it is a matter worth very favourable consideration. In the meantime a number of claims have been taken up in the hope of further developments taking place.

Several new ventures have been entered upon at Macrae's Flat in connection with steam-dredging. The prospects obtained, I am informed, being sufficiently good to warrant contracts to be entered into by the grantees for, at any rate, two steam-dredges of modern type and large capacity. There are still about eighty miners—European and Chinese—on this part of the field, principally engaged in sluicing and paddocking. The returns although not large are, I believe, still considered satisfactory, whilst the introduction of steam-dredging is looked forward to with great hope for the future of the place.

No new developments have taken place in quartz-mining, and work on those lodes which are still being operated upon has been of necessity much retarded by the scarcity of water for motive-power. Messrs. Donaldson have erected an aerial tramway for conducting the quartz to their mill. I am informed they have about 500 tons ready for treatment. Messrs. Sutherland and Glover, at Dunback reef, I hear, have some 250 tons waiting treatment. From the claim of Cunningham and party a couple of trial crushings have been made at the Nenthorn batteries, both giving an average of 1 oz. per ton. It is probable that this party will erect a small crushing plant for their own use. Nenthorn remains very quiet, although some good yields have been secured on a limited scale. Messrs. Mills have continued working on the old Surprise reef, but the country has proved very hard. They have succeeded in getting one or two crushings, showing, I am told, up to 2 oz. per ton. Messrs. Sligo Brothers, I understand, have now secured the old Cressus battery, and are working the Blue-slate reef. They are stated to have 350 tons at grass. The old Consolidated Claim is now being worked by Messrs. Eggers and Peddie. I believe some very good stone has been taken out by them, 70 tons yielding, I believe, 80 oz. of gold. McConnell and Wright attempted to work the Jacob reef, but owing to the smallness of the lode gave it up. It has been described to me as only 3 in. wide, but the return for 8 tons was about 20 oz. of gold; but even that was not found to be payable with so very small a reef to work on. Messrs. Gallery and McConnell are stated to have worked with considerable success in the claim on what was formerly known as Kitchner's Fortune. They had a crushing of 63 tons of stone with a yield of 70 oz., and have now 50 to 60 tons ready for the mill. The Bonanza Mine is stated to have changed hands at a figure not divulged, and it is understood that the new proprietors contemplate considerable outlay in placing the mine in first-class working-order, extending the tunnel some 500 ft., erecting an aerial tramway, and making other improvements.

Several other small parties are at work on the old lodes about Nenthorn, all obtaining a little gold. Altogether a good many hundreds of ounces of gold have been obtained from Nenthorn and the neighbourhood during the past year, and I feel sure the amount would have been very largely augmented had water been at all reasonably plentiful.

There is positively nothing new to report from the neighbourhood of Hamilton's, Patearoa, or Upper Taieri. No advance has been made yet as to dredging the Taieri near Patearoa, operations still pending the result of legal proceedings in the Supreme Court. No further progress has been made with regard to the quartz-mining claims at Rough Ridge, although frequent statements are being made regarding arrangements being completed with some London capitalists to work the lodes on a large scale. Idaburn, Blackstone Hill, and Hill's Creek show no difference worthy of note, and the same remark applies to German Hill, in Ida Valley. At Black's No. 3 a considerable sum has been spent in attempting again to exploit the deep lead there. The work has been carried out so far in a very practical manner, and the party who have undertaken this very difficult work deserve every success. There is a drift to be dealt with, which hitherto has proved fatal to several shafts. No doubt the gold is there if it could only be got at. At Black's sluicing has been almost at a standstill, but somewhat of a fresh departure has been made in dredging the flat. Several new special claims have been granted in lieu of those surrendered. Further prospecting has been carried on, and the consequence is that a large and up-to-date steam-dredge is now in course of erection on the flat. Nearly the whole of the plant is on the ground, and it is anticipated a start to work will be made in the course of a few weeks; the proprietors are very sanguine of success. The old-established sluicing properties at Matakaniui and that locality have been kept idle for a most vexatiously long time during the year. A few weeks ago, however, there was an increase of water, enabling the

majority of the claims to be started. I have no doubt that the results will again be satisfactory. The long-anticipated amalgamation of the well-known Undaunted Company with the Mountain Race Company has at last been brought to a satisfactory settlement. The new company will be known as the Undaunted Gold Mining Company, (Limited); the capital £15,000, in 150 shares of £10 each. The payable nature of the ground is, of course, well known, and the new arrangement will enable the company to work much more economically, so that a successful future is pretty well assured. No further steps, so far as I am aware, have been taken with regard to the construction of the large reservoir in Thompson's Gorge. No doubt it would be of great value to the locality if carried into effect.

At St. Bathans and the vicinity the work has been carried on with the vigour usually displayed by the miners located thereabouts, but from the prevailing cause the quantity of ground worked has been much diminished. It is unnecessary to make allusion, under the circumstances, to each individual claim or company, as it would practically be a constant repetition of the want of water hindering work being carried on continuously. Exception may, however, be made with regard to one or two cases in which new machinery and appliances have been started. The M and E Water-race Company have recently erected a powerful elevating plant, which will enable them to reach the lower and richer strata existing in their claim. With this improvement in their method of working I anticipate a successful future for the company. Mr. Ewing's claim at Kildare Hill still shows signs of continued richness. The elevating plant is, I believe, still being increased, and is the largest, I understand, now at work in the colony. The claim at Vinegar Flat, owned also by Mr. Ewing, has been better supplied with water, and I understand the return has been highly satisfactory. On this property a new device, perfected, I understand, by Mr. Ewing himself, has been brought into use—the "stone transit." It has been described as consisting of an aerial tramway 30 ft. high, strong cables on which the "traveller"—conveying the stones—runs. It is worked by a winch (on the bank), which is driven by water-power and a Pelton wheel. The span is about 100 yards; it moves about one cubic yard per truck, averaging 20 tons per hour. The truck is raised from the paddock to the "traveller" by iron hooks, and is conveyed along the cables to its destination, where it empties itself, then returning to the paddock, where another truck is awaiting it ready filled. One practical man can work the "stone transit," saving much labour. The winch and appurtenances are all under cover. There are from sixteen to twenty men employed on the claim, which is lighted at night with electric light of 3,000-candle power, and about ten heads of water are used. Mr. Ewing's claim at Cambrian's has also been vigorously worked, with very satisfactory yields. Gray and Fordham: Davis's party and others are believed to be on payable ground.

The Cambrian dredge is nearly ready for a commencement. It is of the most modern description, all appliances being of the very best. It is 65 ft. in length by 29 ft.; buckets of a capacity of 4½ cubic feet; ladder, 40 ft.; tables, 216 superficial feet; compound engine of 20-horse power. The elevator will stack the tailings 15 ft.; its estimated capacity, 120 cubic feet per hour. It has cost the proprietors £4,000.

I regret to say that the St. Bathans Channel, which is the only outlet for the claims in the St. Bathans Basin, is in a bad state, and is rapidly filling up, and unless there is a very marked increase in the water-supply for flushing it out I am afraid the consequences may be disastrous. It is much to be deplored, as very large sums have been from time to time expended on it, and very considerable interests are at stake.

Notwithstanding the many drawbacks the mining population has not diminished to any appreciable extent during the year, and in the anticipation of the dredging operations proving a success, and the increased supply of the all-necessary water, both from natural causes in the way of more rainfall and the conservation scheme now promised, better times may be reasonably looked forward to.

Closer settlement is taking place consequent on further opening up of the Otago Central Railway. The business transacted in the Courts shows no diminution, whilst the revenue also keeps fairly up, as the following items will show: Business licenses issued, 18; water-race licenses, 258; general registrations, 675; miners' rights, 574; residence sites, 15; complaints in Wardens' Courts, 44; ordinary applications, 481; special claims and licensed holdings, 81; applications opposed, 61; revenue and deposits, £3,259 8s. 6d; fees and fines, Warden's Court, £30 2s.

The amount of gold raised during the year I estimate at 19,000 oz.

I have, &c.,

S. MEAD DALGLIESH, Warden.

The Under-Secretary, Mines Department, Wellington.

## No. 12.

Mr. Warden MCCARTHY to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Clyde, 1st June, 1898.

I have the honour to enclose herewith the annual statistical returns, and to submit the following report on mining matters in the sub-districts under my supervision, for the year ended the 31st March, 1898.

### WAKATIPU AND ARBOWTOWN.

There is nothing of importance to report upon in these subdivisions of my district. No new discoveries have been made, nor has there been any startling "finds" of the precious metal. The yield of gold has, if anything, increased, and the revenue is in excess of the previous year. Although there has not been the same activity in the mining industry as has been observable in the other portions of my district there has been a not inconsiderable amount of capital invested in various ventures of a more or less substantial nature, and it is to be hoped that the investors will not be disappointed in recouping their outlay with a good margin of profit.



## HEAD OF LAKE WAKATIPU.

The only quartz-mine at the head of Lake Wakatipu has been abandoned and the license cancelled. In alluvial mining about the same number of men are employed as last year, and are earning fairly good wages.

## MOKE CREEK AND TWELVE-MILE.

The same remarks are applicable to Moke Creek and Twelve-Mile district. The Moonlight Sluicing Company has paid the shareholders good dividends, and two other large claims have been taken up on the same run of gold.

## SKIPPER'S AND UPPER SHOTOVER.

Several quartz areas have been taken up during the past year, but nothing has been done in actual work on them. The Achilles Goldfields (late Phoenix) is temporarily shut down for want of capital, and the old Gallant Tipperary Quartz-mining Company (Limited) is about to appear under another name, having gone into liquidation and been purchased by a syndicate. The Leviathan and Crystal Companies have been shut down during the past twelve months. Alluvial mining appears to have flourished much better; all those sluicing appear to be well satisfied with the results of the year. There are several private companies hard at work getting their plants and pumps to work, in order to endeavour to wrest the gold from the bed of the Shotover River by hydraulic lifting as soon as the river goes down to winter level.

## MACETOWN AND ARROWTOWN.

The Glenrock Consolidated, Limited, (formerly the Premier), at Macetown, have had a prosperous year, and have become a *rara avis* among gold-mining companies—a dividend-paying one. The Westralian and New Zealand Gold-explorers, Limited, (formerly the Tipperary), too, have more than paid their way, which is saying a good deal. The Homeward Bound and Victor Emmanuel reefs have been vigorously prospected, but nothing very rich has been found. The Arrow Tunnel company are said to be on a very rich wash, and are employing a number of hands. An Invercargill Company has taken up the Arrow River bed, at Arrowtown, and are pushing on work with great activity. It is proposed to work the claim by hydraulic lifting and sluicing. The company has secured extensive water-rights, and the work of bringing on the water is energetically being pushed on.

## KAWARAU.

A dozen dredging claims have been taken up, but as yet not a single dredge has been built. One at Victoria Bridge will soon be at work, but it will be a long time before the other claim-holders can expect to commence operations, owing to the impossibility of the necessary machinery being placed on the ground for some considerable time.

## CARDRONA.

Four dredging claims have been taken up on the Cardrona River, but for the same reason as already stated it will be some time before any work can be done on them.

## CROMWELL.

*Alluvial.*

During the year ended the 31st March, 1898, no new discoveries of payable sluicing ground have been made, and, with the exception of Quartz Reef Point, alluvial mining remains much as it did this time last year. At Quartz Reef Point, however, several parties have been and are still doing very well, while the remainder are getting enough gold to make them stick to their claims.

## BANNOCKBURN.

Very little is now heard of the syndicate which (through Mr. T. O. Matthews) was understood last season to be in treaty for the whole of the mining property on the Bannockburn. Mr. Matthews holds a 50-acre claim on the deep lead, but has as yet done nothing to develop it. All the old hands are still working along as fast as the water-supply will permit them, but no exceptional finds are reported.

A few hands still manage to find a living in the basin of the Roaring Meg, but the quartz reef between the Meg and the Gentle Annie seems to have fizzled out.

Most of those who for years have worked on the Criffel have left, but Mr. Schlaast, on behalf of the New Eldorado Company, has been granted a 50-acre claim, so that faith in Criffel is not yet quite dead.

Weir and party are working a 24-acre claim on the Motatapu, but with what success I have not heard.

Although no startling finds are reported from Midrun work is still being prosecuted there, and the old hands seem contented, which, I take it, means that they are making a decent living.

The upper reaches of the Lindis have come into prominence during the year, and several parties are at work there, while on the same river below Rumbling Gully several claims are being steadily worked.

## LOWBURN.

Werner and party are developing a 40-acre claim at Lowburn, with, I am told, fair prospects of success, while a few straggling parties are working at the Five-Mile and adjacent gullies.

On the whole, however, I may safely repeat that alluvial mining has not made great advances

*Quartz.*

In reefing, Halliday and Butler are opening out their 54-acre claim on the Carrick. The Golden Gate Claim is being worked on tribute; while the Lawrences have had no reason to complain. Since the new year they have obtained 147 oz. of retorted gold from 752 tons put through, which may be reckoned fairly satisfactory, seeing that they do all their work within themselves.

The Cromwell tributers have, however, the most reason for rejoicing, for from that mine since the 1st April, 1897, the total output has been 1,212 tons of quartz, yielding 2,464 oz. 3 dw. 6 gr. of retorted gold. I am credibly informed that their September wash-up, wherein they obtained 826 oz. 3 dw. 6 gr. from 319 tons of quartz, was the second best ever obtained from the Cromwell Mine, even in its palmiest days. This, I may add, was the result of ten men's work for four months.

*Dredging.*

*Nevis.*—Dredging has had a chequered career during the past twelve months. Four dredges have been at work on the Nevis, while four more are either in construction or are being projected. Some of those at work have had satisfactory returns, while others have not been quite so fortunate, although all have more than paid wages. The Upper Nevis Company have brought their dredge to their lower claim below the township. Allan and Aitken's pontoons at the Nevis mouth are now ready for the machinery, which is expected to be in position very shortly.

*Cromwell.*—Dredging has not been so successful on the Upper Clutha, where Talbot's current-wheeler is closed down. Crookston's is being removed to below Cromwell Bridge to work McPherson's two small claims, and McLay's is expected to follow in a few days to operate upon McPherson's Hartley Beach Claim. Hotop's (Maori) will then be the only dredge left on the river above Cromwell Bridge. I understand that unless the returns of the last-mentioned dredge improve shortly it will be moved up the river to work the ground lately held by A. C. McGeorge.

The Hartley and Riley Beach Company's dredge is now awaiting the machinery, and I understand that the promoters are sanguine of success when they get a commencement made.

On the lower Kawarau the Electric Company's No. 3 dredge is approaching completion. Their No. 2 dredge is doing very well on their No. 3 claim, while their No. 1 dredge is testing their No. 2 claim, rumour says, with very satisfactory results.

Good progress is being made in building the Magnetic Company's dredge at Kawarau Gorge.

As I write this I am told that Crookston's dredge has successfully shot the rapids above Cromwell Bridge.

During the year twenty-five applications for special claims and licensed holdings were made; ten mineral leases and licenses were entered, and 272 ordinary applications dealt with; 552 miners' rights were issued, whilst the goldfields revenue, including deposits, amounted to £2,368 7s. 4d., which exceeds that of the previous year by £331 7s. 4d.

## CLYDE AND ALEXANDRA.

With the exception of the Fraser River, which has maintained an average supply, all the creeks and gullies in this district have during the past year furnished very poor supplies of water. Mining, therefore, by means of sluicing has been seriously hampered. Many of the owners of races and persons following this occupation, however, are possessed of small areas of land, and with the products of this, together with the gold obtained, they may be considered to be in a fairly prosperous condition.

Two or three parties are obtaining payable gold on the Dunstan Commonage, the fact of the ground being shallow and highly auriferous enabling them in a few months to make fair wages for the year. The banks of the Clutha between the two towns still engage the attention of the owners of the Fraser River right-holders, but the ground is exceedingly difficult to get away, and were it not for the abundant water-supply at their command payable working could not be carried on.

Messrs. Gartley Brothers, at Springvale, are profitably occupied, as are a few on Tucker Hill, near Alexandra; but Messrs. Rivers and Gartley, who purchased the rights of Jackson Brothers, have been seriously handicapped during the past season in consequence of the extreme drought.

It does not appear that the number engaged in the various gullies and creeks around the neighbourhood has depreciated, nor, on the other hand, has any increase taken place, but I am given to understand that the individual earnings are not less than the average of previous years.

*Dredging.*

For several years this industry has been gradually progressing, but never has it presented such a prosperous condition as now. There are thirteen dredges at work within a distance of four miles on the Clutha River, and three in the Manuherikia about the mouth of the Manorburn, while five are in course of construction upon the former and three upon the latter river. Those in course of construction on the Clutha are: The Earnsclough No. 2 at Sandy Point, the Golden Beach at Poverty Beach, the Matau at Mutton Town Point, the Unity opposite the Dunstan Hospital, and the Vincent at Clyde, each of which will cost £5,000 and upwards. On the Manuherikia, the Chatto Creek and the Nil Desperandum are approaching completion, whilst the old Morning Star is being re-erected, with the addition of many modern improvements, for the New Zealand Dredging Company's Claim, adjoining the Lion Rock.

Of those at present working, the Moa has had the most sensational returns during the past year. In June operations were commenced in the river opposite the historical Frenchman's Point, and in seven weeks 590 oz. were netted, the largest weekly return (said to be a record in these parts) being 288 oz.



During the year a considerable amount of lost time was incurred, both in overhauling the machinery and in consequence of the height of the river; nevertheless gold to the value of £8,710 was obtained, and out of this the fortunate shareholders got £5,600, being £1,750 more than the total paid-up capital.

The Molyneux Hydraulic Company's dredge, which was completed and commenced operations in May last, the cost being £5,500, is, I think, the most capable and efficient one now at work upon the Clutha. The ground is generally considered below the average quality, and presents greater obstacles to the working probably than any other dredge has to cope with; yet during the period from the 23rd May last to the 26th ultimo 1,100 oz. were obtained, which is about an average of 25 oz. per week. It is calculated that 11 oz. will cover working-expenses and leave a small margin for wear-and-tear, so now that the company has cleared off all arrears and has placed itself on the dividend-paying list the shareholders may reasonably expect a few years of continued prosperity.

No dredge in these parts whose returns are made known to the public can, I think, show a more consistent and withal payable record than the Enterprise Company's. Work has now been carried on about four years and a half on the company's claim opposite Sandy Point, and, judging from the small amount of shifting, at least a similar term must elapse before new ground need be looked for. During last year 1,089 oz. were obtained, out of which the directors were able to declare dividends amounting to £1,250. When we take into consideration the fact that the dredge is by no means up to date in strength and in general appliances this handsome profit speaks volumes for the auriferous nature of the beaches and banks—of which there is practically no limit—between Clyde and Alexandra.

Through the courtesy of Messrs. Kelman and Spencer I am in a position to state that the Chicago and the Earnsclough No. 1, both dredging at Sandy Point, have had a very successful year. The latter, being a more powerful dredge, has produced a third more gold than the former, but in both cases the profits are extremely satisfactory.

The proprietors of the Eureka No. 1 (Leijon and party), Ngapara (Ross and others), and the Perseverance steam and current-wheeler (Finlay and party) being unwilling to divulge the result of their operations I am unable to say more than this: Judging from the steady work all of them have put in, from the pertinacity with which they confine themselves to about the same spots, and from the general well-to-do air of the interested parties I have no hesitation in saying that they are occupying prominent positions in the van of prosperity.

The Victoria, which for some weeks made fruitless efforts to bottom the claim of that name opposite Clyde, has been absorbed in a company named the Island Basin, and is now undergoing a complete overhauling at Alexandra, prior to being taken down to the claim a few miles below. This dredge had previously been on the Island Basin Claim, having been built for it; and, although prospects which would be deemed highly payable for a suitable steam-dredge were obtained, it, being at the time a current-wheeler, was found to be incapable of competing with the moving drift. The public here will watch with considerable anxiety the outcome of the second visit, as not only are there several claims taken up on the various beaches of the river above and below, but it will be the first time this portion of the river has had the opportunity of being tested by a steam bucket-dredge.

Barely an inch of the Manuherikia River and the adjoining low flats from Alexandra to the mouth of Chatto Creek is now available for application, and, judging from the activity displayed by some of the claimholders, the time is not far distant when a large fleet of capable dredges will be seen at work here. Judging also from the look of the wash and the very satisfactory returns from those at present working I think the confidence reposed in this locality as suitable for successful dredging will not be found to have been misplaced. No doubt some of the claims will prove to be richer in the precious metal than others, and probably some will be operated upon by more efficient dredges than others, but from the prospecting which has been done, taken with the results of actual working, it is generally supposed that the average all over will not be less than 20 oz. a week.

The Manorburn dredge, situate near the mouth of the creek of that name, was the first to commence, and, although it is far from being as efficient as those since built, the shareholders have little reason to complain. Many delays were caused during the year from various reasons, but the gold obtained, which is valued at £2,515, must have left a considerable margin of profit.

The Turakina was the next to try conclusions on an adjoining claim, and being a well-constructed dredge—the builder having profited by the weaknesses of the Manorburn—it commenced and continued to do its work faithfully and well, the result being that from the end of November to the middle of March gold to the value of £945 was obtained, which enabled the directors to declare the first dividend on the Manuherikia.

The Lion Rock, the only other dredge at work at present, is also on an adjoining claim. It has not long commenced, but during this short time the returns have been quite equal to those of the neighbours, and Mr. Herbert Park, who has superintended the construction of the three, informs me that a magnificent seam of wash has been struck.

The Chatto Creek and the Nil Desperandum, a few miles higher up, are very near completion, and the Morning Star, lately brought from the Shotover, will not be much behind them. Timber has been ordered for at least three more, and probably by this time next year ten dredges will be at work upon the river.

#### *Agriculture and Horticulture.*

The last season has been very disastrous to most farmers around this neighbourhood, and coming as it did immediately after one which was equally bad makes it doubly hard for those who depend almost solely upon the results of cropping.

There are a few exceptions to this state of affairs, but only where water for irrigation has been available.

Fruit, on the other hand, has been most abundant, and, although a large quantity has found its way to a market, a little less than that realised upon has either been fed to the pigs or wasted altogether. The chief market for the orchardist here is Dunedin, and to land it there necessitates a seventy-mile journey. Notwithstanding this obstacle, however, a continuous stream of wagons may be seen during the season wending their way to the nearest railway-station.

#### BALD HILL FLAT AND OBELISK RANGE.

Mining matters have progressed favourably here since my last report. No new finds have been developed, but all existing claims continue to furnish payable results. There is a large extent of auriferous ground of medium quality in the neighbourhood, but at present the number of claims which can be worked is limited by the quantity of water available. Obelisk Creek and Flat are the centre of operations, and in the event of this being worked by dredging, which is not improbable, the water now used would be set free for ground unsuited for any other method than sluicing, which would double the number of breadwinners in this somewhat neglected locality.

The Last Chance Company (Hesson, Simmonds, and party) employ about nine men, and, being the holders of a good water-supply, experience very little lost time, except in hard frosty weather. Their claim includes the creek, and is of a depth of from 16 ft. to 23 ft. The ground is fairly good, as will be shown by the return of 256 oz. for eleven weeks' work, during which time about half an acre was put away.

Mr. Ewing has lately shifted his plant, which consists of a mile of piping, to the upper end of his claim, adjoining Wilkinson's. Unfortunately, Mr. Ewing has no permanent water-supply; otherwise the ground is good enough to reward him liberally for his pluck and energy.

Mr. Wilkinson has yet a considerable strip of ground to put through, and if this is as good as that which he has worked during the last few years Mr. Wilkinson, perhaps, will not require another claim. Messrs. Carroll and Lynch are now, I am pleased to say, recouping a substantial benefit from the result of a lot of dead-work. Their claim is undoubtedly a good one, and will occupy their attention for a good few years to come.

During last winter and early spring several small parties got some nice patches on the river at and about the Nine-Mile. During the time they were working very few made less than a pound a day, and one party of three for the short season obtained gold to the value of £600. Work can only be carried on here when the river is low, generally in the months of July, August, September, and sometimes October. During this period, under favourable circumstances, many nice little rises are made.

#### Quartz.

The two reefs at present being worked on the Old-Man Range—viz., White's and the Excelsior—continue to pay the enterprising proprietors in a satisfactory manner. White's Reef, owned by Mr. Robert Symes, has now engaged upon it seven hands. During the year a considerable amount of what is termed dead-work has been carried on in further developing the mine. The battery has been shifted down to a more suitable position to receive the stone, and a kind of puddling-machine has been erected for the more effective treatment of the pug, which in some instances carries highly payable gold. Mr. Symes informs me that, taking everything into consideration, he has never been better satisfied with his prospects than at the present time.

The Excelsior reef, on Coal Creek Spur, owned and worked by Messrs. Gray Brothers, has by the results from the past year's labours proved highly satisfactory to the proprietors. The last cake, which took five men five weeks to procure, weighed 52 oz. 18 dwt., and was got from 40 tons of stone. Mr. F. Gray informs me that the stone is being traced steadily downwards to deeper levels and that the general outlook of the mine is exceedingly good. Both reefs are above an altitude of 3,000 ft., so that in the winter months a good deal of lost time is experienced.

#### ROXBURGH.

##### Sluicing.

Like Bald Hill Flat the water-supply has been quite up to the average of previous years, and mining by means of sluicing in these parts has not by any means depreciated. Two or three new claims have been opened out, while nearly all, if not all, the old claims are still working.

The Pleasant Valley Gold-mining Company has had a very prosperous year. The claim, which is rather difficult to work because of the rugged nature of the country, is situate on the bank of the Clutha about a mile or so above the mouth of Coal Creek, the supply of water being obtained from Elbow Creek and one or two other little streams not far distant from the claim. The company is a small one, consisting of a thousand shares of £1 each. Gold to the value of £1,981 was obtained during the year, £850 of which amount was returned to the shareholders in dividends. The capital paid up is £560, while the plant necessary to produce this result does not exceed in value £500. The find is looked upon as one of very great importance in this part of my district. A claim adjoining has been applied for, and the future outlook of the company is so good that steps have been taken to increase their holdings.

Haughton and party, on Commissioners' Flat, are working steadily, and seem quite satisfied with what they are getting, as also are four or five small parties on the west bank between Coal Creek and Roxburgh, who, being the owners of the water used, are making excellent wages.

The list of dividend-paying companies has still among its number the Roxburgh Amalgamated Company, whose claim is situated immediately opposite the Town of Roxburgh. A large strip of country has been sluiced away during the year, and a considerable number of men are continuously employed. The ground is generally of a poor character, and it is only by a wholesale disposal of it that a company composed of such a large number of shareholders can hope to obtain a return for

the investment. Loudon and party, and one or two others working in close proximity to this claim, are realising good results.

The once famous Hercules Nos. 1 and 2 Claims at Hercules Flat, now owned by Mr. John Ewing, are kept steadily going under the management of Mr. Robertson, with what result I cannot say, but I am credibly informed that fair interest on the capital invested is being obtained.

Mr. Ewing also owns a special claim of 100 acres at Anderson's Flat, upon which he has expended during the year a large sum in prospecting by means of boring-rods, hired for the purpose from the Vincent County Council, but after several unsuccessful efforts to bottom the rods were found to be unsuitable, and the work has been postponed for a time.

The Island Block Extended Claim at Miller's Flat, purchased by the Golden Run Company, has been worked when water was available. The supply is a poor one, and a considerable amount of lost time has been the result. The wash, however, is very good, and the company has determined to expend £500 in raising the wall of their dam, which will considerably increase the working-time of the company.

The Island Block Company's ground, I believe, is now being worked by tributers, but with what result I cannot say.

Gunton Brothers, on Craig's Flat, who lately purchased the interests of James Sullivan, amid the usual difficulties resulting from a spasmodic water-supply, are doing very well, and devote their spare time to strengthening and increasing their dams.

Several other parties are working the banks of the river in this locality with more or less prosperity.

#### *Dredging.*

Although some of the claims have done exceedingly well the industry as a whole if not languishing is certainly not making the progress the extent and quality of the ground would warrant. The dredges in use are fast getting behind the age both in size and appliances. The average cost, I am told, did not exceed £2,750, whereas dredges of twice that value are necessary to cope with the constantly moving drift in the river here. The beaches and banks from Coal Creek to the Island Block are known to be highly auriferous, and present no real difficulty in working with anything like up-to-date machinery.

The Dunedin Gold-dredging Company, although on payable gold now, has not had a successful year. The weekly returns have barely averaged two figures, and the operations may be set down to have been carried on at a slight loss.

The old Edina dredge, now owned by Miss Ryley, has for a few months been prospecting a claim in the river just above Roxburgh. Shortly after starting some good gold was struck, but, unfortunately, the machinery gave way, and since then frequent breakages have occurred, thereby preventing all chance of following the gold up.

The dredge once the property of the Roxburgh Gold Steam-dredging Company, in liquidation, was purchased by a party of six working-men at a cost of £600, and is now prospecting on Mr. Youngman's claim opposite Roxburgh. The claim has been held off and on for about eleven years, and this is the first time a dredge has been placed upon it. The river is very deep here, and rather more than the ordinary amount of drift will have to be dealt with.

The Ettrick dredge, situate just above the town of that name, has been working most of the year very steadily and profitably. Out of the 430 oz. obtained the shareholders divided £808.

The Bengerburn Company were unsuccessful in their efforts at the mouth of the Benger Creek, and the dredge is now working on tribute.

The Golden Treasure dredge, near Kerr's Creek, has done exceedingly well. The company is composed of three thousand shares at £1. The gold obtained was 1,177 oz., out of which the fortunate shareholders netted £2,300.

The Otago Company, near the punt-site at Miller's Flat, made a profit of £1,800, whilst the Golden Gate, whose dredge is at McCunn's Beach, favoured the shareholders with £1,375.

The Golden Lead Company did not meet with success at McCunn's Beach, and are about to move the dredge to opposite Craig's paddock.

The Golden Run Company's dredge having proved incapable of working into the bank at the head of the Island Block, at the front of which some excellent returns were at one time got, steps are being taken to have constructed a dredge with all the modern appliances.

Pringle and party and Bennet and others have both done well, but do not wish their actual returns made public.

#### WAIKAIKIA AND CAMPBELL'S.

The little excitement which prevailed in these parts at the beginning of last year has now subsided. A considerable amount of prospecting was done in connection with two or three reefs which for years have been known to exist, but apparently the result has not been sufficiently satisfactory to warrant any further expenditure. Some good has arisen, however, from the influx of new blood, for a considerable quantity of hydraulic plant has been taken over the hill with a view to working the Waikaia River, and I believe that everything is in readiness to make a start, and should success attend the venture no doubt others will follow in due course.

#### *Agriculture and Horticulture.*

These industries have not suffered nearly as much from drought as they have in Central Otago. The crops, both of cereals and of fruit, have been good and well saved, and taking the farmer's condition generally I should say it is healthy and prosperous.

#### CLYDE, ALEXANDRA, AND ROXBURGH.

During the past year fifty-four special claims and licensed holdings, covering an area of 2,995 acres, were applied for, and sixty, embracing 3,102 acres, were granted and issued. Sixteen coal

leases and licenses, including 235 acres, were applied for, and seven, of an aggregate area of 160 acres, were issued. Thirty-three complaints were dealt with, 464 ordinary applications (ninety of which were opposed) were heard and determined, 810 miners' rights were issued, and the total goldfields revenue, exclusive of deposits, which amounted to £1,092 4s. 6d., totalled £2,390, exceeding that of the previous year by £416.

I have not been able to obtain the results of the past year's workings from all the dredges and sluicing claims in this portion of my district, some of the owners being unwilling to furnish details; but through the courtesy of the proprietors and secretaries of the companies hereunder I am in a position to supply, in the aggregate, some returns from a few of the proprietors, giving also the approximate amount of capital involved. I may state, in doing so, that some of the parties not included in the return are those who have, I believe, obtained the best results.

Name of Company or Party.	Capital involved.	Total Gold obtained.	Value.
	£ s. d.	Oz. dwt. gr.	£ s. d.
<b>DREDGES.</b>			
Spencer and party (Chicago) ...			
Kelman and party (Earnscleugh No. 1) ...			
Clyde Dredging Company (Moa) ...			
Manorburn Gold-dredging Company ...			
Molyneux Hydraulic Company ...			
Enterprise Gold-dredging Company ...			
Dunedin Gold-dredging Company ...	59,540 0 0	13,321 0 0	51,618 17 6
Ettrick Gold Steam-dredging Company ...			
Golden Run Dredging Company ...			
Golden Treasure Dredging Company ...			
Roxburgh Gold Steam-dredging Company ...			
Otago Dredging Company ...			
Pringle and party ...			
<b>SLUICING.</b>			
Hesson, Simmonds, and party ...			
Carroll and Lynch ...			
Gartley Brothers ...	11,710 0 0	2,652 0 0	10,276 10 0
Pleasant Valley Gold-mining Company ...			
Gunton Brothers ...			
Louden and party ...			

S. ERNEST MCCARTHY, Warden.

The Under-Secretary, Mines Department, Wellington.

### No. 13.

Mr. Warden CAREW to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Dunedin, 21st May, 1898.

I have the honour to forward herewith the annual statistics for the Hindon portion of the Otago Mining District for the year ending the 31st March last.

An average number of about 115 miners have found employment in the district.

The Deep Stream Hydraulic Sluicing Company (Limited) completed their first water-race in December last, and up to the 31st March had obtained about 216 oz. of gold. On the claims held by the Barewood Quartz-mining Company (Limited) three shafts have been put down on the line of reef, about half a mile apart, to a depth of 200 ft. In one of the shafts an easterly drive at that level, about 40 ft. in from the shaft, struck a lode about 8 ft. thick containing gold, and is being followed by driving both north and south. The low-level tunnel, a heavy undertaking, is in about 200 ft.

Lyders and party, of the Golden Burn Company, hold claims on the same line of reef, but on the opposite side of the Taieri River. They have a battery of ten head of stamps, and have done a considerable amount of prospecting and development work. I understand they have a lode, averaging about 5 ft. of stone, which is gold-bearing, but contains arsenical pyrites, for which they require additional plant.

Other reefs are being prospected, and there are a large number of known auriferous reefs in the district, but the problem is to work rather low-grade quartz at a profit.

I have, &c.,

E. W. CAREW, Warden.

The Under-Secretary, Mines Department, Wellington.

5—C. 3A.

## No. 14.

Mr. Warden KEDDELL to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Warden's Office, Invercargill, 15th June, 1898.

I have the honour to forward herewith returns for the year ending the 31st March, 1898, and to furnish the following report as to the condition of the mining industry in this district:—

## OREPUKI.

Mining on this field is of a very settled and steady nature. Nearly all the available water is on the ground. The number of men employed and the quantity of gold won does not vary much from year to year. The work in past years has been carried on chiefly in the gullies and low flats, but as these have become worked out the energies of the miners are now turned to the terraces, and during the past year several exceptionally good ones have been opened out. Unfortunately for the sluicers these were selected in the early days for residence purposes, and portions were converted into freeholds when the purchase of residence areas was in vogue, with the consequent result that patches of freehold at irregular intervals obstruct the miner, often leading to litigation or substantial compensation to avoid it.

On the whole, the number of men employed and the returns of gold for the past year is reported to be above the average.

## ROUND HILL AND LONGWOOD.

The Round Hill syndicate have increased the length of their water-race by extending it to out-lying creeks, and thus added to their working-power.

The Ourawera Gold-mining Company possesses a first-rate elevating plant in good working-order, and during the past year some handsome dividends have been paid.

The Longwood Range is still being vigorously prospected in different localities, and one or two gold-bearing reefs have been struck. The stone when tested was pronounced payable.

## WAIAMOUTH (WEST).

This is a newly opened field. During the past year the miners have been chiefly employed in bringing in water, which is a somewhat heavy undertaking, the country being flat, and the water low-lying, thus necessitating long races. One race about fourteen miles in length is on the point of completion; and another a few miles shorter is finished, thus enabling the owners to be at work sluicing. There are other races in various stages of construction. A well-defined run of gold has been traced for about two miles and proved to be payable. Most of the claims granted are extended claims of 1 acre.

On the Waiau River a number of dredging claims have been taken up. The reports from those which have been prospected appear to be of a satisfactory nature, and one company is negotiating for a dredge.

The Waiau Mouth Elevating Company (east side) have recently constructed a water-race and erected elevating machinery on one of the back beaches, about 5 or 6 chains above the present high-water mark. This company is reported to have bottomed on payable gold.

## WILSON'S RIVER.

The Morning Star Company is the only reefing claim in this locality that is turning out gold, and for the past year has given some good returns. The last two crushings have fallen below the average, but work is being pushed on. Other mines on the field are prospecting for the reef with varying results. A battery is in course of erection for the Alpha Company, and is expected to be in operation at an early date.

A number of men are still employed in alluvial workings. The population is reported to be about four hundred all told.

Communication with this field is chiefly confined to the regular steamer or casual cutter, but an overland track from the Waiau River is nearly completed, the through journey taking about four days. This track runs through gold-bearing country, and several prospecting parties are out along the line of it, but so far no applications have been made for any ground between Waiau mouth and Wilson's River field.

## WYNDHAM.

There is no noticeable change here—indeed, to judge by the business in the Warden's Court I am inclined to believe that mining has decreased since last report.

In conclusion, I may state I am indebted to others for the information contained in this report. Since I have assumed charge of this district during the absence of Mr. Poynton my time has been so fully occupied that I have had few opportunities of making myself fully acquainted with this large field, which I am satisfied will become a very great and populous centre of mining. There is a general feeling throughout this district of its large capabilities, and capital alone is required to make it one of the first in the colony.

I have, &c.,

JACKSON KEDDELL, Warden.

The Under-secretary, Mines Department, Wellington.

## No. 15.

Mr. JAMES COUTTS, Inspector of Mines, to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Inspector of Mines' Office, Thames, 18th April, 1898.

I have the honour to forward herewith the annual statistical returns and my report on the mining industry for the Auckland District for the year ending the 31st March, 1898.

The gold-mining industry in this district has not turned out as well as was anticipated in the early part of the year. This, I consider, is due to the large areas of ground taken up where neither gold-bearing lodes or rock favourable for the precious metal existed, and consequently the prospecting operations in a number of cases have resulted very unsatisfactorily. There were also a number of men sent out to prospect who had no knowledge of the nature of the country in which gold-bearing lodes were to be found, and with no experience of the work; therefore a number of the claims were abandoned.

There has also been a large amount of money spent recklessly in the erection of crushing plants where there was no payable ore in sight to warrant the outlay. However, it is pleasing to state a number of the companies have gone in for systematic mining and erected first-class machinery in the shape of pumping- and winding-engines; also batteries with the most modern appliances for saving gold and silver, some of which have already proved that the expenditure was warranted; and this has, in my opinion, been the means of putting the mining industry on a more satisfactory basis on this goldfield. There is also every prospect of the gold returns being greatly increased in the coming year, as several batteries that were in course of construction have now been completed.

## COROMANDEL.

*Kapanga Mine.*—The operations in this company's mine in the early part of the year were chiefly confined to the development of the low levels. A considerable amount of driving was done between the 500 ft. and 1,000 ft. levels, but without success. A bore was also put down with the diamond-drill from the bottom of the shaft to a depth of 225 ft., and as the bore proceeded assays of the core were taken regularly as it was brought up, and in some instances the gold obtained was most encouraging. Some six months since the management decided to let blocks of ground on the different leaders on tribute. Some of the miners at once took advantage of the opportunity, as they had reason to believe that payable gold could be obtained at the upper levels, and so far some of the tributers have been very successful. The blocks of ground let on tribute are from the 400 ft. level upwards, the company reserving every alternate block on the line of the reef, thus securing the company an opportunity of getting a share of anything good that may be discovered in the adjoining blocks. The prospect of the company looks more encouraging than it has done for years, as the lode is intact at the 400 ft. level for some considerable distance. Forty men are employed on wages and thirty on tribute.

*Scotty's Mine.*—This company in the early part of the year was pressed for the want of funds, and it was found to be necessary to stop operations and apply for protection to enable the directors to raise money to carry on the works they contemplated doing to develop the mine. Since work has again been resumed the shaft has been sunk to a depth of 415 ft., and a level opened out at the 400 ft. level for the purpose of intersecting the Brewers' reef, which has been worked to a considerable extent in the upper levels. At the 300 ft. level, driving, sinking, and rising are being carried on the same reef, which is a strong body of quartz, and is all saved for treatment. Thirty-three men are employed in the mine.

*Britannia Mine.*—The company's mine has been continuously worked during the year. The shaft has been sunk to a depth of 240 ft., and a chamber opened out at 220 ft., from which three cross-cuts have been driven. In the eastern drive a reef formation was met with 40 ft. from the chamber, and this was driven for a distance of 80 ft., but not meeting with any payable quartz this was discontinued. The cross-cut west was driven 220 ft., and a reef cut 2 ft. thick, which was driven on for a distance of 210 ft. The south-west cross-cut has been driven 280 ft., and a reef cut and driven on 100 ft. north and 90 ft. south. A little gold has been seen in this reef, which is 1 ft. in thickness. This reef is being worked on at an intermediate level, about 130 ft. above the bottom level, with very encouraging results. As the reef has carried gold for a distance of 70 ft. it will now be necessary to connect this level with the 220 ft. level for ventilating and to give better facilities for opening up this portion of the mine. A 10-horse-power steam-engine is used for winding, and steam is supplied from a 20-horse-power boiler to work the pumps. Twenty-three men are employed. No returns.

*Golden Lead Mine.*—A considerable amount of work has been done in this company's mine. A surface-level was put in from the side of the creek, which intersected Scotty's reef, but as there was very little quartz over this level it was deemed advisable to drive a low level to open up the reef at a depth. The reef was met with at 280 ft., and has been driven on for some distance with most encouraging prospects, gold being freely seen in the quartz every time it is broken down. Five men are employed.

*New Hero Mine.*—Prospecting works are being carried on in this mine. Two men are employed.

*Pigmy Mine.*—This mine was protected, but the company have again resumed operations, and are now driving prospecting levels to intersect the West Tokatea reef. Three men employed. No returns.

*East Hauraki Mine.*—This company has done a considerable amount of work, and are driving an intermediate level to cut the West Tokatea reef. A large quantity of gold has been taken out of this mine, and the manager is sanguine of meeting with quartz in payable quantities at any time. Three men are employed.

*Great Kapanga Mine.*—This mine was protected, but three men have been lately employed in putting in a prospecting-drive to intersect any reefs that may traverse the property. Very good gold has been obtained from time to time from leaders cropping out on the surface, and it is fully expected payable ore will be met with in the drive that is now being put in.

*Conquering Hero Mine.*—This company have two men employed prospecting various reefs and leaders that have been cut at the low levels, and although nothing of importance has been discovered this year, yet the quartz in some places is of a kindly description for gold.

*Tokatea Consols.*—The mine has been continuously worked, and although there has not been a large quantity of quartz produced, yet some of the leaders that have been operated on have given excellent results. Thirty-three tons of quartz have been put through the mill for 169 oz. 9 dwt. of gold, which may be considered very encouraging. Nine men have been employed.

*Hauraki Associated.*—This company's mine has been continuously worked, and they are systematically developing their property. A large quantity of payable crushing-ore is being obtained from the Rainbow End, Foot-wall, and Nicholls leaders, on which driving, rising, and stopping operations are being vigorously carried on. The leaders vary from 2 in. to 1 ft. in thickness, specimens being obtained in the Foot-wall leader at Nos. 1 and 2 levels nearly every breaking-down; also hauls of picked stone are frequently met with in the other leaders. A battery, consisting of twelve stamps and four berdans, has been erected at Kennedy's Bay, a distance of three miles and a half from the mine; and, as there will be some difficulty in getting the quartz carted to the battery in the winter, the management have decided to erect an aerial tramway from the low levels to the mill, which will no doubt be a considerable saving when once erected. 341 tons of quartz have been crushed during the last four months for the return of 1,101 oz. of gold. Forty men are employed.

*Harbour View Mine.*—This company had protection for the mine in the early part of the year, but have now two men employed stoping on the Blue Peter leader at the No. 3 level in the ground formally known as the North. The leader is 6 in. in thickness, gold being frequently seen in the quartz as it is broken out, and occasionally picked stone is obtained. The quartz is all saved for treatment; also a considerable amount of work has been done. At No. 2 level two tributaries are working on the Ben Bow leader, and three on the Simpson leader on the Nos. 1 and 2 levels in the Harbour View section.

*Royal Oak of Hauraki.*—This company's ground now comprises the Tokatea and Royal Oak, an area of 114 acres 3 roods 11 perches. A large number of men are employed, forty in the Tokatea and forty in the Royal Oak section. The companies being amalgamated gives much better facilities for opening up and developing the property. The Tokatea shaft has been sunk to a depth of 170 ft. below the No. 7 or main adit level. A chamber has been opened out at this level, and driving is now proceeding east and west on the reef, which is about 2 ft. in thickness. The quartz at this level is highly mineralised and contains a fair amount of the precious metal, and hauls of picked stone are frequently obtained. This may be considered very encouraging, as this is the greatest depth that gold has been found on the eastern side of the Tokatea Range. In the upper levels the leaders are being systematically opened up, and, although the mine has not produced a large quantity of crushing-dirt, yet the stone crushed has been exceedingly rich. Since the month of August 205 tons 15 cwt. have been put through the mill for a return of 9,695 oz. 19 dwt. of gold. This reflects with great credit on the management for the confidence and perseverance displayed in opening up this valuable property, which there is every reason to believe will repay the shareholders for the outlay. There were difficulties to contend with in the commencement of the year which retarded the work, but this has now been overcome, and the prospects of the company look more hopeful than they have for some considerable time.

*Queen of the North Mine.*—This company has four wages-men and six tributaries employed in the mine. The company is driving a low level to intersect the various leaders that have been worked on the surface-levels. The tributaries are engaged working on leaders on the surface, and are meeting with a fair amount of success.

*Hauraki Gold-mining Company's Mine.*—This company is still one of the largest gold-producers in Coromandel, and it is pleasing to hear that new discoveries are being made, which help to keep up the returns. The new find at the 300 ft. level has considerably assisted in augmenting the last two months' returns, the store of quartz that is to be obtained at the upper levels being well-nigh exhausted. The shaft is being sunk with all possible speed, and another level will soon be opened up, as rich gold was left in the floor of the 300 ft. level. Something good may fairly be expected when the next level is reached and the lode intersected. Considerable improvements have been made in the pumping and winding-engines. A pumping-engine has been erected on the main shaft, which is estimated to pump to a depth of 1,500 ft., and in the Union Beach section pumping and winding-engines have been erected, which are capable of hauling the stuff and pumping the water to a depth of 1,000 ft. 3,463 tons 8 cwt. of quartz have been crushed during the year for 7,258 oz. 1 dwt. of gold. Ninety-four men are employed in this company's property.

*Hauraki Main Lodes Company (Limited).*—The company's mine is situated on the beach below high-water mark, and is adjacent to the Union Beach and Golden Pah shafts. The works in progress have consisted in sinking the shaft to a depth of 180 ft., and a chamber was opened out at a depth of 150 ft., from which cross-cut drives have been energetically pushed on for the purpose of intersecting any reefs that may traverse the property. In the No. 1 drive south the country has been of a favourable description, but so far nothing of importance has been met with. In the No. 2 north-west drive a mullocky reef was cut through, which contained a considerable amount of mineral, but no gold could be seen in the stone. In the No. 3 drive west nothing has yet been discovered. A new pumping and winding plant has been erected, which, to all appearance, will be capable of contending against any water that may be met with. Twenty-four men are employed, but no returns of gold have yet been obtained.



*New Golden Pah Mine.*—This company has continuously worked their mine, employing forty-six men on various works—erecting machinery, sinking shaft, and driving levels, &c. Prospecting operations have been carried on at the 80 ft. level, the 180 ft. level, and the shaft at the time of my last visit was down a depth of 220 ft., and they were then preparing to open out for another level. The country that has been passed through in the shaft has been of an excellent description for gold, and it will certainly be a disappointment if payable ore is not met with here, more especially as high-class ore was taken out of the upper levels. 48 tons was lately crushed from the main reef (Jewellers') and the other leaders for 168 oz. 16 dwt. of gold. The pumping- and winding-engines have been erected, and the work in connection with them has been carried out in a substantial manner.

*Kathleen Gold-mine.*—This company have had twenty-seven men employed for the greater part of the year. The shaft has been sunk to a depth of 240 ft., but the work of driving has been confined to the 200 ft. level. The south cross-cut has been driven up to the boundary, but without meeting with any important discovery. Hartridge's reef has been driven on easterly for a distance of 500 ft. This reef is 4 ft. thick, but of a mullocky nature, and, although the country on each side of the reef is all that could be desired, yet nothing of an encouraging nature was found in the reef. The reef has also been driven on the west, but with no better results. The Carlyon and Hauraki North reefs have also been driven on east and west of the cross-cut, but nothing payable has been met with. The machinery and everything in connection with this mine is in excellent order, and it is to be regretted this company did not meet with better success.

*Bunker's Hill Mine.*—The operations in this company's mine have been chiefly confined to the No. 2 level and 130 ft. level. There was also some work done on the leader below the No. 2 level. Driving and rising have been carried out on the Legge reef, but without discovering any payable ore. Driving has also been done on the Nos. 1 and 2 reefs, and, although gold has been frequently seen in the quartz, yet nothing has been met with that might be considered payable. Twenty-one loads of quartz have been treated during the year for a return of 148 oz. 7 dwt. of gold. From eight to twelve men have been constantly employed. A Tangye winding-engine has been erected, which is worked by a 40-horse-power Tangye boiler, which has no difficulty in hauling the stuff up and keeping the water down.

*Hauraki No. 2 Mine.*—This company has done a considerable amount of work in the shape of driving. A large body of quartz was cut through in the north-east cross-cut, but the tests made of it from time to time showed that it was very low-grade ore. The ground has been protected for some time, and the pumps are now being taken out of the shaft.

*Golconda Mine.*—This company has eight men employed. The work in progress is at present confined to putting a rise up from the bottom level to No. 1 level, for ventilation and to give better facilities for working out a block of ground on No. 1 leader. The leader shows gold freely, and the manager is confident a block of ground that is intact between the bottom level and No. 1 level will pay well to take out. Several other leaders have been worked in this mine with a fair amount of success. 17½ tons of ore has been crushed for 28 oz. of gold.

*Welcome Find Mine.*—The company have done a large amount of work in this mine during the year. The principal work has been driving and stoping on what is termed the Southern lode, which is about 4 in. thick; also driving on the No. 2 reef, which is 6 in. thick. A large amount of work has been done in the shape of driving cross-cuts, and as the country is mostly of a hard nature the cost of driving has been something considerable. 58 tons of quartz has been put through the stamps for 238 oz. of gold. Fifteen men are employed.

*Hauraki North Mine.*—This company have done a large amount of work in opening up the mine, and, although the leaders in the upper levels have not turned out as well as expected, yet the prospects met with in driving at the 150 ft. level were sufficient to warrant the sinking of a shaft for another level. The shaft has now been sunk to the required depth. A chamber has been cut out, and a cross-cut drive is being put in to intersect the leaders that were worked with success at the upper levels. 222 tons of quartz have been put through the mill for 135 oz. 2 dwt. of gold. Fourteen men are employed.

*Hauraki South Mine.*—This company has continuously worked their mine, employing fifteen men, the principal work being the sinking of the shaft. The shaft is 13 ft. 8 in. in the clear, and is sunk to a depth of 150 ft. There has been a good deal of water to contend with, but the work has been very successfully carried out. A chamber has been cut out on the south side of the shaft at a depth of 142 ft., and a cross-cut drive is being driven in a westerly direction for the purpose of intersecting any reefs or leaders that may run through this part of the property. 10 tons of quartz has been crushed from leaders on the surface-levels for 9 oz. 8 dwt. of gold.

#### OPITONUI DISTRICT.

*Kauri Freehold Gold Estates.*—This company has carried on extensive works during the year. A tramway has been laid from Whangapoa to the mine at Opitonui, and a locomotive-engine is employed in conveying material from the landing-place to the mine. A branch line is also in the course of construction up the Oweru Valley. There is also a considerable amount of work being carried on at the mines on the different sections of the property. Several levels are being put in, and two shafts are sunk. On one of the shafts a pumping and winding plant has been erected. The other shaft is being put down for the purpose of connecting the St. Hilda level with this shaft, which has been driven a distance of 520 ft. on a large body of stone, containing a fair percentage of the precious metal. From the tests made of the different reefs on the property the superintendent is sanguine that when the works are all completed and battery working there will be no doubt as to its ultimate success. Two hundred men are employed.



## KENNEDY BAY DISTRICT.

*Bay View Mine.*—Four men are employed in driving a level from the side of the hill for the purpose of making a connection with the bottom of a winze that has been sunk on a leader from No. 2 level. Good specimens were obtained from this leader in sinking the winze, and it is anticipated that as soon as communication is effected the company will be in a position to open up a payable block of ground on this leader from the bottom of the winze.  $3\frac{1}{2}$  tons of quartz has been crushed from this mine for a return of 17 oz. of gold.

*Flossie Mine.*—Three men are engaged in driving on a small leader on the surface-level. The leader is about 2 in. in thickness, and has been driven on for a distance of 60 ft.  $1\frac{1}{2}$  tons of quartz has been crushed from this leader for 36 oz. of gold.

*Evening Star Mine.*—Two men are engaged in driving on a leader 4 in. in thickness at No. 3 level. As gold is seen frequently in the quartz in breaking it out the block of ground that is being opened up, the manager considers, will be payable. No returns from the mine this year.

*Morning Star Mine.*—This company has driven a distance of 40 ft. on a small leader, which prospects fairly well, and the manager intends shortly to have some of it crushed. Should it prove to be of a payable character more men will be employed to open up the mine. There has been no returns from the mine this year. Two men are employed.

There are a few men employed in prospecting in this district, and as the Hauraki Associated has erected a ten-stamp battery, and are prepared to crush for the public, the companies or miners trying ground in this locality have better facilities for testing or crushing the quartz than ever they had before, which will no doubt be the means of opening up some payable ground and be a boon to the people living in the district.

## WAIKOROMIKO DISTRICT.

*Four-in-Hand Mine.*—The work in this mine has been chiefly confined to driving on the reef, which is 3 ft. 6 in. in thickness, and has been driven on for a distance of 150 ft. at the low level and 120 ft. at the surface-level. The prospects of this mine are of a very encouraging character, but as there has been no facility for getting the quartz crushed the mine was for some time protected; but as a road is now being made from the Hauraki Associated battery to the mine the company will soon be in position to have the quartz carted and crushed, if the directors may deem it advisable, before erecting their own battery. Operations in the mine are, I am informed, at once to be pushed on vigorously, and there is a likelihood of some of the adjoining properties being amalgamated with this one, which will no doubt give better facilities for working the mines. Seven men have been employed on the mine for the greatest part of the year.

*Waikoromiko Mine.*—Two men are employed driving on a lead 14 in. in thickness, which has been driven on a distance of 60 ft. Fair prospects have been obtained by crushing the quartz in a mortar, but no returns have been obtained.

*Forest Queen, Cuirassier, and Tandem.*—These companies have done a large amount of work in opening up the mines, and the prospects are encouraging, but the difficulty has been in getting the stuff to a battery, consequently the mines are protected pending arrangements as to the best method of working the claims. The Tandem had 2 tons crushed for the return of 2 oz. 12 dwt. of gold.

*Fabulous, Tainui, Tainui Extended, and Arawa Mines.*—These mines have done a large amount of surface prospecting, but no returns have been received. They are all at present protected.

## PORT CHARLES DISTRICT.

During the years 1896 and 1897 a considerable number of claims were taken up, but in many cases only a very limited amount of work was done, such as surface-prospecting, but with no encouraging results. In some of the holdings a fair amount of work has been done and several reefs discovered which contained gold, yet nothing of a payable character was found except in the Eve Claim, situated between Big Sandy and Stony Bays, and held by McNeil Brothers. This has been constantly worked during the last eight months with three men, giving handsome returns: 1 ton 4 cwt. 2 qr. produced no less than 356 oz. 14 dwt. of gold. The reef has only been worked to a small extent on the surface, and a level put in, which has intersected it about 30 ft. below the place where it crops out on the hill. At this level it has been driven on for a few feet. The reef is not as large as where it is worked on the surface, being only 14 in. in thickness in the face of the drive, the quartz being of a favourable description for gold. I am informed the stone taken from the reef at this level gives good prospects, although I could see none in the quartz broken out. As it is a considerable distance from the beach, and expensive to get the quartz to a battery, the owners decided to take in more ground, as they only held a small area, and consequently the Jay Gould and De Hirsch Claims have been included in their claim. They have received offers, and intend to accept one of them, for the purpose of getting a company floated.

*Hauraki Peninsula Mine.*—This mine has an area of 80 acres 2 roods 32 perches, and is situated between Big Stony Bay and Cape Colville. The syndicate are driving a low level for the purpose of intersecting a reef which has been stripped on the surface. The reef is from 7 ft. to 8 ft. in thickness. Some of the quartz that has been assayed, I am informed, has given payable results.

*Port Jackson Mine.*—This syndicate is only carrying on surface prospecting, and so far nothing of importance has been discovered. Two men are employed on this property.

There are only three holdings being worked in this district, employing eight men.

## CABBAGE BAY DISTRICT.

*White Star Consolidated.*—This mine comprises several holdings, making an area of 750 acres, which has been prospected to a considerable extent by Bewick, Moreing, and Co., who held for some time an option over the property. The reefs were driven on for some distance, but no gold was

discovered except a few pounds of specimens that were obtained from a small leader in No. 3 level, where a winze was sunk on it to a depth of 37 ft., and as nothing of a payable character was found the property was given up, and only two men are now employed in the mine.

*Queen Victoria of Hauraki Mine.*—There are two men working in this mine employed in breaking out a few tons of quartz from the main reef, for the purpose of having it crushed to ascertain if it will be payable to work. A small crushing of 42 lb. of stone was put through for 2 oz. 14 dwt. of gold.

*Jersey Mine.*—This mine has been steadily worked during the year. Some very fair specimens were obtained from a small stringer of quartz, and a small parcel of 2 tons was put through the battery from here, which gave a return of 51 oz. of gold. Six tons was also put through the stamps from the leader at a low level, which gave a return of 18 oz. 18 dwt. of gold. There is also a reef 4 ft. 6 in. in thickness, on which a considerable amount of work has been done in the shape of driving and sinking, but as the prospects met with were not of an encouraging nature the work here was discontinued. Three men are employed in the mine.

*Cuvier Light.*—There has been a large amount of work done on this property in trenching and driving. Two reefs have been driven on for a distance of 80 ft. A small leader 2 in. in thickness has been driven on 300 ft. Four prospects were obtained in places in driving on this leader, but nothing of a payable character. No returns have been obtained from this mine. Two men are employed.

*Canopus Mine.*—A cross-cut has been driven a distance of 26 ft. from the side of the hill, which has intersected a reef formation 9 ft. in width, but so far this has proved to be of no value. There has been some trenching and driving done at different places, but nothing that may be considered payable has been found. Two men are employed on the property.

*Antipodes Holding.*—Three men have been steadily employed in surface prospecting and driving. A cross-cut drive has been put in a distance of 112 ft. This was driven for the purpose of intersecting a reef which was discovered on the side of the hill some considerable height above the drive.

There are several properties in this district on which a large amount of work has been done, but most of them are at present protected.

#### CADMAN'S GULLY.

*Aitkin's Freehold.*—This property is being systematically prospected, and has been continuously worked, employing from four to seven men. The principal work has been driving and sinking on the reefs, which vary from 6 in. to 18 in. in thickness. Gold is frequently seen in the quartz, and the prospects of the mine are of an encouraging nature; but no returns of any quartz having been crushed have been received.

*Katie, Empress, and All Nations.*—These mines have been occasionally worked, but nothing of importance discovered to warrant any great outlay of capital to develop any of the reefs that may traverse the claims. Eight men at intervals have been employed in these mines.

*Karaka Block.*—This property is being worked by a syndicate, who have had ten men continuously employed for the last six months. Very good prospects were obtained on the reef that was discovered at the outcrop on the side of the spur. The reef here was 4 ft. thick and contained a large amount of iron-pyrites, and gold could be freely seen distributed through the quartz. A considerable amount of driving and sinking has now been done on the reef, and 5 tons of quartz has lately been crushed for a return of 36 oz. of gold.

#### TIKI DISTRICT.

*Coromandel Freehold.*—This company bought this property about twelve months ago, and as this is an English company with large capital the mine, in all probability, will be systematically developed. The manager is pushing on with works on the various reefs and leaders that traverse the property. The Blackmore and Home Rule reefs vary from 2 ft. to 3 ft. in thickness, and have been driven on for a considerable distance, and as a large amount of gold was obtained from those reefs by different parties from time to time it may fairly be expected the mine will be payable when the company is in possession of a battery and the mine opened up. 10 tons of quartz was lately crushed, which gave a return of 9 oz. 10 dwt. of gold. Ten men were employed last time the mine was visited.

*Progress Castle Rock.*—This company has five men employed, the principal work being confined to driving a low level to intersect the reef which will be connected with No. 2 level. The reef will average 15 in. in thickness, and has been driven on at No. 2 level a distance of 900 ft. and connected by a rise with No. 1 level; the distance between the two levels being 74 ft. The reef has also been driven on 600 ft. at No. 1 level. It is intended to pass all the quartz down the rises to the bottom level, where it will be conveyed from this level to the battery by a ground tramway, a distance of 2½ chains. The ground is being levelled off and excavations made preparatory to the erection of the battery.

*Pohutu and Nelson Mines.*—These mines are being worked by a syndicate and have six men employed. Four men are engaged in driving a low level to intersect the Nelson and Matawai reefs. The drive is in a distance of 175 ft., and should the reef keep the same underlie as it has at the upper levels it should be cut at 220 ft. The other two men are driving and prospecting in the Nelson section. No gold returns.

*Royal Mint.*—Two men are employed in driving and surface prospecting.

*Light Brigade.*—There are three men working on this claim, driving on a reef and surface prospecting.

*Magnet Mine.*—This mine has two men employed sinking a winze on a reef 18 in. in thickness. A little gold can be obtained in crushing the quartz in a mortar, but not sufficient to warrant them sending any to a battery for treatment.

*Pukehau Mine.*—This mine was protected for six months, but operations have again been resumed, five men being employed in driving on the reefs. So far no gold has been obtained.

#### MANAIA DISTRICT.

*British Fleet Mine.*—There are only two men employed driving a level to intersect the Golden Hill reef. This drive is in a distance of 90 ft., passing through good country with nice mineral veins running through it. No returns.

*Little Minnie Mine.*—Three men are employed driving a level to intersect a reef 2 ft. thick that has been tried on the surface. A little gold is sometimes seen in breaking the stone on the outcrop, and it prospects fairly well. The low level is in a distance of 105 ft., and the reef is expected to be reached in another 40 ft. of driving. No returns.

*Golden Hill Extended.*—This ground is being worked by a party of four tributers, who have done a large amount of work on the different reefs that run through the property. A two-stamp battery is on the claim, but this has not been worked for some time. There have been no important discoveries made, and no returns from the mine.

#### GREAT BARRIER DISTRICT.

*Great Barrier Gold- and Silver-mining Company.*—This claim was formally known as Ryan's Freehold. At time of visit the principal work in progress was sinking a shaft and driving a low level to intersect the reef. It is intended to drive the low level a distance of 600 ft., and connect with the shaft, which is to be sunk to a depth of 200 ft. When this is completed it should give about 290 ft. of backs, with a considerable amount of crushing dirt. The reef averages about 18 in. in thickness, and the quartz is of a kindly description. Samples of the ore have been taken and tested from time to time, and I am informed they have given good results, and the value of the bullion obtained from the assays averages from £7 to £152 per ton. A surface or higher level has been driven 230 ft. in the hill further up than the shaft to intersect a large reef which crops out on the surface. A small winding plant has been erected over the shaft. Twenty-four men are employed.

*Iona Gold- and Silver-mining Company.*—The work now under way in this mine is driving a low level on the western branch of the Iona reef, which averages about 4 ft. in thickness. I am informed that assays have been made of the reef in different parts which proved satisfactory, averaging about £5 to £7 per ton. A top level has also been driven 100 ft., at which distance the Iona main reef was cut, which is a large body of stone. From this reef also samples were taken and assays made, which gave an average value of about £7 10s. per ton. It is the intention of the company to push on the driving in the low levels from the western branch of the Iona reef to enable them to cut the reef at a depth where it is cut in the top level, which would give a considerable amount of backs. Seven men are employed.

*Kaitoke Mine.*—Six men are employed in this mine. Driving in the No. 1 level has been extended to a distance of 340 ft. for the purpose of cutting a reef which has been discovered on the surface, but has not been proved as to size. Samples have been taken out, and, I am informed, averaged about £13 per ton. Driving has also been done in the No. 2 level, and a cross-cut of 120 ft. has been put in to cut the Barrier No. 3 reef. There are several reefs in this ground, which have been stripped and trenched on the surface, two of which average 18 in. and 15 in. in width.

*Great Barrier Gold- and Silver-mining Company.*—This company has done a considerable amount of work, and are now driving on the reef at a distance of 325 ft. The reef is about 18 in. in thickness and looks promising. A ton of stone was treated, and, I am informed, gave a yield of 4 oz. of gold and 1,500 oz. of silver, which was considered very satisfactory. Only six men are engaged.

*Mount Argentum Gold- and Silver-mining Company.*—There are four men employed in the mine. The principal work in hand is sinking a winze on the reef, which is about 4 ft. in thickness, and from assays we are led to believe that the reef's value is about £6 per ton. The winze is down a depth of about 30 ft. A considerable amount of surface prospecting and trenching has been done on the ground, and several reefs intersected, some averaging 3 ft. 6 in. in width.

*Barrier Gold and Silver Estate Company.*—The principal work in progress in this mine is driving a cross-cut to cut the Barrier No. 3 reef, which is expected to be met with at a distance of 300 ft. The cross-cut has been driven 120 ft. through a boulder formation, but now it has changed, and a soft blue sandstone has been met with. Eight men are employed.

*Aotea Mine.*—The company are now employed driving a low level to intersect the Iona reef, which was met with in a level 90 ft. higher, and was 4 ft. in thickness. The level has been extended 220 ft., but an additional 200 ft. will have to be driven before the reef is cut. Six men are employed.

*Staffa Mine.*—A branch of the Iona reef is supposed to pass through this property, as it has been cut in a higher level, and is 2 ft. in thickness. The company are now employed driving a low level to cut the reef, which is in a distance of 230 ft. Four men are employed.

*Original Great Barrier.*—This company have ten men employed, and the principal work in hand is driving a No. 2 level to cut the reef which was cut on the top levels. The reef should be met with at a distance of about 500 ft., of which 230 ft. has already been driven. The reef is 2 ft. in thickness in the upper levels, and, I am informed, is of good value. Driving is also being carried on in the low levels, but a considerable distance will have to be driven before the reef is cut. Ten men are employed.

*Kauri Freehold Block (Whangaparapara).*—This claim has been worked by the New Zealand Exploration and Anglo-Continental companies under an option for two years. A low level is being

driven on the line of reef, which is about 2 ft. wide, and is valued at £2 per ton. A few reefs have been discovered on the block by surface prospecting, and average from 1 ft. to 12 ft. in width, but no returns have been made. Fifteen men are employed.

*Egerton Mine.*—This company are proceeding with two levels. The first or top has been driven on a distance of 80 ft., 40 ft. of which has been driven on the reef, which is 1 ft. in thickness, and is valued at £3 per ton; the latter or low level has also been driven on a distance of 80 ft. Driving on the hanging-wall, which is 14 ft. wide, is now being carried on. Eight men are employed.

#### KUAOTUNU DISTRICT.

*Mariposa Gold-mining Company.*—This company has done a very large amount of prospecting and developing work, employing from forty-five to seventy men during the greater part of the year. The principal work on the Try Fluke section is stoping and rising over the low level on the Try Fluke reef; also driving an intermediate and prospecting level. On the Mariposa section driving, stoping, and rising operations are proceeding on the Try Fluke reef, and all the stone broken out is taken to the battery. In the Venus section the cross-cut has been driven 600 ft. and the Red Mercury reef cut, which averages about 1 ft.; also the western lode, which is about 9 in., but so far has not proved of much value at this level. Work at present is confined to the development of the New East lode and the preparing of a chamber, &c., for deep-sinking purposes at No. 4 level. Of the former, the new lode was picked up east of the Fluke reef, and has been driven upon 300 ft., averaging 2 ft. 6 in. in thickness, and a large section stoped out. The lode has produced good payable ore, and from indications we have every prospect of its value increasing at a deeper level. A cross-cut is now being put in at No. 3 level, 150 ft. deeper, to intersect the lode, and it is expected to be cut within a month. With regard to the chamber, this is now all but ready for the erection of a steam-pumping and winding plant, which is on the way out from Home. The company is also engaged in completing the rise for poppet-heads, rope-way, and smoke-passage. From indications there is every reason to believe that the deep levels will be productive of eminently satisfactory results. The drainage of the lodes will also be a great boom to surrounding claims. The returns for the year show 4,440 tons crushed for 1,531 oz.

*Kapai-Vermont Gold-mining Company.*—This company's operations have been chiefly confined to stoping on the Try Fluke reef, between Nos. 1 and 2 levels. The reef has varied from 1 ft. to 20 ft. in thickness, and as some of it has been low-grade ore the quartz that was sent to the battery for treatment had to be carefully selected. The quartz in the upper levels is now almost exhausted, and in consequence the directors have been considering a scheme for the future development of the mine at lower levels. 2,785 tons of quartz has been treated during the year for 1,864 oz. of gold. Thirty men are employed in the mine and battery.

*Great Mercury.*—Operations are confined to the Red Mercury section of the mine. The lodes under development are three in number—viz., Just-in-Time, Red Mercury, and Foot-wall reef. The ore bodies vary from 6 in. up to 2 ft. in thickness, and are very patchy in character, and as a result the stone has to be selected. The ore is free milling, and in consequence there is no trouble with the cyanide process. The extraction is from 85 to 90 per cent., and the cost of treatment is 4s. 10d. per ton. 470 tons of quartz and 433 tons of tailings has lately been treated for 332 oz. of gold. Sixteen men have been employed in the mine and battery.

*Waiata Gold-mining Company.*—This company's mine has been continuously worked during the year. The operations have been directed in opening up and developing the various reefs and leaders. Connections have been made by passes from Nos. 1 to 4 levels, and a rise is now being put up from No. 5, or bottom, level to No. 4 level. When this is completed they intend to run the quartz down through the passes from the upper levels to the No. 5, where it will be trucked out to a hopper that has been erected near the mouth of this level; thence it will be conveyed from here by a ground tramway to the battery, which is likely to be erected a distance of about half a mile. The reefs and leaders vary from 6 in. to 18 in., and as they have been driven on at the different levels for a considerable distance large blocks of ground are now available for stoping. As the quartz broken out of the drives has been of a payable nature the prospects of the company may be considered very encouraging. Twenty-six men have been employed in this mine.

*Irene Gold-mining Company.*—This company have five men employed driving south on the Try Fluke reef from the bottom of a winze that has been sunk to a depth of 100 ft. from No. 1 level. This drive is in a distance of 40 ft. from the winze, but only a portion of the reef is saved for crushing, which is 5 ft. thick. The reef has been driven and sunk on in other places, but so far nothing payable has been found. 100 tons of quartz was put through the stamps for 15 oz. 13 dwt., and 85 tons of tailings treated by the cyanide process yielded 27 oz. 10 dwt., of gold.

Prospecting operations are being carried on in the following mines with two men on each, viz.: Maoriland, Ajax, Mint, and Alpine Fluke.

*Matarangi Mine.*—Four men are tributing in this mine.

#### BOAT HARBOUR DISTRICT.

Claims have been taken up in this district but no returns have been made.

#### OPITO DISTRICT.

A number of areas have been taken up and a little prospecting done, but no returns received.

#### MAHAKIRAU DISTRICT.

About eight prospectors are employed in this district. No returns received.

## PREECE'S POINT, COROMANDEL.

*Preece's Point Gold-mining Company.*—The company have sunk the shaft to the required depth, and opened out a chamber, on which has been erected a pumping and winding plant. There is no work at present being done in the shaft, and the men are engaged driving two surface-levels. It is the intention of the company to resume work in the shaft again shortly. Six men are employed, including two engine-drivers.

*Golden Shore Gold-mining Company.*—This claim is situated at Preece's Point, being on the foreshore. A reef in this property crops out on the beach, but cannot be worked owing to the tide. It is a good-sized body of stone, and samples taken from it have shown some good dabs of gold. The company are now sinking a shaft on the beach a little below high-water, and are down a depth of 70 ft. It is their intention to sink another 15 ft. or 20 ft. and to open out at the 75 ft. level. Ten men are employed.

## MATA DISTRICT.

*Three Sisters.*—Two men are employed on this claim, and are engaged in driving a low level to cut a lead which varies from 4 in. to 12 in. in thickness. The drive is in 106 ft., and they expect to cut the reef in another 30 ft. Half a ton of quartz has been sent to the School of Mines for treatment. There are also a party of three men sluicing in the Gentle Annie Creek, who are getting a little gold, but no important discoveries have been made.

## TAPU DISTRICT.

*Mahara Royal Gold-mining Company.*—This is an English company, who have erected a ten-stamp battery and six berdans, the ore being treated by amalgamation. A water-race has been constructed for a length of a mile and three-quarters, which gives an effective fall of 260 ft., and is capable of carrying thirteen sluice-heads of water. A Pelton wheel is used for driving the mill, which is connected with the race by 14 in. pipes. In erecting the battery provision was made for the erection of additional stamps and other gold-saving appliances with a small outlay if it was found necessary. A ground tramway has been constructed from the mine to the battery, a distance of 21½ chains, which has a slight grade, and is worked by a horse. The mine is well opened up. The principal work in hand is driving and stoping on the reef at No. 2 level, which is 90 ft. above the tramway. This drive has been driven on the reef for a distance of 350 ft., and is connected by a rise with No. 1 level, where a considerable amount of work has been done on the reef. The reef is 4 ft. thick and is well defined. There is every appearance of it improving in depth, as a winze is sunk some 25 ft. on it from No. 2 level, where it fully maintains its size and quality. A main drive has been started on the tramway level, which is termed No. 3 level. This drive will have to be driven a distance of about 500 ft., but as it has to penetrate through hard country it will take some time to complete it. There is no immediate hurry for this drive being pushed on to cut the reef, as there is abundance of quartz in sight to keep the battery crushing for some considerable time. A cross-cut drive is being put in to intersect a reef that has been discovered on the hill some distance away from the workings. This drive will give 100 ft. of backs. The reef is 3 ft. and gives good prospects on the surface. 1,420 tons of quartz has been treated at the battery for 823 oz. of gold. Thirty-five men are employed, including the men at the battery.

*Sheridan Gold-mining Company.*—This mine has been continuously worked with an average number of twenty men. Five additional stamps have been erected, making the plant fifteen heads and six berdans, the ore being treated by amalgamation. A large amount of work has been done on the leaders in the surface-levels, but as a crushing of 373 tons of quartz treated from here only gave a return of 10 oz. 16 dwt. the most of the surface or upper levels were discontinued. The principal work now in progress is driving on the lead at the low level to get under the point where the winze is being sunk from No. 3 level. When this is accomplished they will be in a better position for conveying the quartz from the upper levels to the battery, as the stuff can then be passed down from one level to another at a small cost. 443 tons has been treated for a return of 118 oz. 5 dwt. of gold.

*Shannon Mine.*—Three men are engaged in surface prospecting. A cross-cut has been put in from the side of the hill, and a lead 10 in. thick intersected. The quartz is of a kindly appearance, and gold was occasionally seen in breaking it out; also excellent prospects are met with in the loose stuff on the surface. No returns.

*Golden Band Mine.*—Two men are employed in driving on a reef 8 in. in thickness, which gives very good prospects; but no quartz of any consequence has been treated to prove the value of the mine.

*Little Jessie Mine.*—Three men are employed in driving south on the reef at No. 3 level. 20 tons of quartz has been crushed from the mine for 6 oz. 6 dwt. of gold.

*Golden Point Gold-mining Company.*—A large amount of work has been done by this company in driving and sinking. A winze has been put down on the leader to a depth of 100 ft. below the bottom level, but as the company has been very unfortunate in not discovering gold in payable quantities application for protection was applied for and granted. 20½ tons was crushed for 1 oz. 1 dwt. of gold. Ten men were employed the greater part of the year.

## WAIOMO DISTRICT.

*Monowai Mine.*—This company has fifty-four men employed, and is thoroughly opening up the mine, with the intention of proving the value of the different reefs that run through the property. In the Monowai section, No. 3 B level, a drive has been driven along on the foot-wall side of the reef for a distance of 500 ft., and the reef cut through in places and found to be on an average 30 ft. thick. In the southern drive at this level the reef has been driven on for a distance of 300 ft., which will be connected with No. 3 B level. A winze is also being sunk on the reef from No. 2

level, which will give excellent ventilation to this part of the mine. In No. 2 low level in the Gem section the reef is 8 ft. thick, and has been driven on for a considerable distance. As this level is connected by a tramway, three-quarters of a mile in length, with the battery it is the manager's intention to pass all quartz that is broken at the upper levels down through the rises that connect with this level, and run it direct into the mill. A tramway is also in course of construction from the Monowai level, a distance of a mile and a quarter. There will be two inclines in this tramway, which will be self-acting, the trucks being let down by a wire rope and brake. The battery, which consists of ten stamps, has been overhauled and put in good working-order, and a portable engine has been put in position to assist in working the stamps when there is not sufficient water in the race to work the plant. The vats and tanks that were used in connection with the dry-crushing process have been removed to the new shed that has been erected a short distance below the battery, where they will again be used for the treatment of the tailings by the cyanide process. It is also the manager's intention to put the ore through the stamps with the wet crushing, and after passing over the tables the tailings will be run through the Brown and Stamford's concentrators, and the concentrates will be sent to England for special treatment. There has been no quartz treated from this mine during the year, but as the battery is now completed regular monthly returns may be expected.

*Toulouse Mine.*—Two men are employed in prospecting on this claim, but nothing of importance has yet been discovered.

*Comstock Mine.*—Two men are employed in driving to intersect the Monowai lode. The drive is now in a distance of 160 ft., and it is expected the reef will be met with in another 100 ft.

*Alma Mine.*—This mine has an area of 98 acres, and is situated between the Puru and Tararu. The Hauraki Peninsula Exploration Company have lately taken over this ground and commenced prospecting operations.

#### TARARU DISTRICT.

*Kaiser Mine.*—This mine has been steadily worked with from three to five men. A good deal of driving and sinking has been done on the leader, which has varied from 6 in. to 2 ft. in thickness. 78 tons of quartz has been crushed for 72 oz. 3 dwt. of gold. Although it has not produced a large amount of crushing dirt, still the prospects met with have been very encouraging.

*City of Auckland Mine.*—Seven men have been employed in this mine. The chief work in progress is in the higher levels. There is also a considerable amount of driving done on the Little Agnes reef, which is about 10 ft. in thickness and assays well, but seems rather difficult to treat. Driving is also being carried out in the Raglan Spur section to intersect the Californian reef, which has been cut in a level near the surface, and is about 4 ft. in thickness. This, I am informed, gives good prospects. The company have also sunk a shaft 170 ft. to the south-west of the low level, and intend to erect a pumping- and winding-engine to work the reef at a greater depth. 3 tons was treated on the Thames for the yield of 12 dwt., and one ton was treated at Fraser's Reduction-works, Auckland, and gave a return of bullion to the value of £3 10s. 8d.

*Puru Consolidated Gold-mining Company.*—A considerable amount of work has been done on this mine, and in the No. 1 level driving has been done on the Rimu reef to a distance of 275 ft., which averages about 2 ft. in thickness. The quartz looks to be of a fair quality, and, I am informed, is free-milling stone, carrying very little mineral. In No. 2 level, which is 60 ft. below No. 1, the reef has been driven on a distance of about 400 ft., and averages about 18 in. The reef on the face at present is about 2 ft. in thickness, and has shown colours of gold when breaking down. When this level is complete it will give a considerable amount of backs. A ten-stamp battery, which is in course of erection, is almost completed, and is to be connected with the mine by an aerial tram. Ten men are employed. No returns.

*Scandinavian Gold-mining Company.*—Four men are employed in this mine in driving on the reef in the north side of the spur. During the year 12 tons of quartz was crushed for 16 oz. 5 dwt. of gold.

*Sunlight Gold-mining Company.*—The work in this mine under way at present is driving on the No. 2 leader, which runs from 2 in. to 2 ft. in thickness. Four men are employed. No returns.

*Argosy Gold-mining Company.*—There has been a considerable amount of work done in this mine, and during the year eight men were employed. At present the mine is under protection, and is worked with two men. No returns.

*Vulcan Extended Gold-mining Company.*—Seven men are employed in this mine. The principal work at present is driving a low-level cross-cut to intersect the Vulcan reef, which averages about 5 ft. in thickness. 2 tons of quartz was crushed for 2 oz. 11 dwt. I am informed that it is the intention of the company to erect a battery at an early date, and the water-race is in course of construction.

*Chicago Gold-mining Company.*—The underground work is at present stopped in this mine, but a considerable amount of work has been done in developing the reefs. During the fine weather the men have been employed on outside work in connection with the erection of the battery, water-race, and tram-line. The battery, which is a ten-stamper one, is near completion, and is connected with the mine by a ground tram  $14\frac{1}{2}$  chains long. The water-race is in course of construction; it is 49 chains in length, and will give a fall of about 260 ft. There is a considerable amount of quartz available to keep the battery going for some considerable time, and it is considered to be of a payable quality. Twenty men are employed.

*Temple Bar Gold-mining Company.*—Two men have been employed on this ground during the year driving on the reef in the low level, which averages about 1 ft., and fair prospects have been obtained by pounding.

*Tararu Creek Gold-mining Company.*—This company has done a large amount of work during the year. The principal work in the mine has been driving the battery-level to connect with the City of Dunedin level, which is also being pushed on from the Tinkers' Gully side. When this work is



completed the quartz broken in the Dunedin section will be passed down from the upper levels to the battery-level and trucked direct into the mill, thus doing away with the cartage. The battery-level is in a total distance of 2,342 ft., 1,092 ft. having been driven on the hanging-wall side of the reef. As the drive proceeded, the reef was cut through in places to ascertain its thickness and value. Its average thickness is 7 ft., and it contains gold in places in payable quantities. In the Tinkers' Gully side the City of Dunedin level has been driven on the same reef mentioned above for a distance of 1,258 ft. There is yet 400 ft. to drive to get to the point where these drives will be connected by a pass, the distance between the two levels being 120 ft. A fire occurred on the 25th March in the battery, completely burning down the house and causing considerable loss to the company, the old stamps, &c., having just been taken out and a commencement made to erect a new thirty-stamp battery. This had also the effect of stopping the battery-level pending the erection of a Pelton wheel to drive the air-compressor to work the rock-borers. A water-race has been constructed three-quarters of a mile in length, capable of carrying eight sluice-heads of water, which has an effective fall of 95 ft. to the battery. 1,579 tons of quartz has been crushed for 427 oz. of gold, and 2,475 tons of tailings treated for 1,670 oz. of gold. Twenty-five men have been employed.

There has also been a number of other claims worked in this district during part of the year, but they are at present under protection—viz., Lylas, Mount Taylor, Eaglehawk, and Ake Ake.

*Waitangi Gold-mining Company, Shellback Creek.*—This mine was under protection for some time in the early part of the year, but since work has been again resumed developing operations have been carried on on the Nos. 3 and 4 reefs in the top level, which averages about 4 ft. Some very fair stone has been taken from these reefs, in which gold is to be seen freely. A parcel of quartz is being sent to the battery for a trial crushing.

*Thames Gold-mining Company, Shellback Creek.*—Four men were employed in this mine in the early part of the year, but of late the mine has been under protection. The only work done was cleaning and timbering old levels.

#### KURANUI DISTRICT.

*Kuranui Mine.*—This mine was worked by the company during the former part of the year, but at present is worked by tributers in the surface-levels. Four tributers had 93 tons of dirt crushed for a yield of 3 oz. 8 dwt. of gold.

*Darwin Mine.*—Two men are employed on this ground driving on the Multun reef in the top level, which averages 10 in. in thickness, and is driven on a distance of 160 ft., and is of a promising appearance. It is the company's intention to break out a few tons for trial crushing. A large amount of work has also been done on the reefs in the low levels, and a parcel of 5 tons of quartz gave a return of 4 oz. 6 dwt. of gold.

*Fearnought.*—This is one man's ground, and is at present being worked by a party of two men, who are employed driving surface prospecting levels, but nothing of importance has been discovered. 2 tons of quartz crushed yielded 1 oz. 14 dwt.

*Tudor Mine.*—Two men are employed on this ground sinking a winze on the Bendigo reef in the low levels. The reef, which has been worked to a considerable extent, averages about 18 in. in thickness. 14 tons of stone crushed gave a return of 32 oz. 3 dwt. of gold.

*New Alburnia Mine.*—Operations in this company's mine have been steadily carried on during the year. The shaft has been sunk to a depth of 100 ft. below No. 5 level, making the total depth of the shaft 563 ft. A chamber has been opened out at this depth, and a cross-cut driven north for a distance of 43 ft., where the Dixon's reef was intersected. The reef was then driven on east and west, and is 2 ft. 6 in. in thickness, containing very nice mineral. At No. 5 level driving and stoping operations have been carried on to a considerable extent on the Dixon's and Sons of Freedom reefs, and the same may be said of No. 4 level. A large amount of work has been done in the shape of cross-cutting and rising for the purpose of making connections with the upper levels for ventilation. The old Sons of Freedom level from the Moanataiari side has been repaired and driving resumed. It is the intention to extend the tunnel a distance of 300 ft. to get under the main shaft, which will require to be sunk 77 ft. to get down to the level of the drive. This will both drain the mine to this depth and give ventilation. 3,775 tons of quartz has been crushed during the year for a return of 1,766 oz. of gold. Forty men have been employed, including the surface- and battery-men.

*Kuranui-Caledonian Mine.*—This company have done a large amount of developing work between Nos. 1 and 4 levels on the Nos. 1 and 2 reefs, and driving and stoping have been carried on to a considerable extent on the Cross reef, Kelly and Darby leaders, at Nos. 1, 2, and 3 levels. During the year 1,726 ft. has been driven on the reefs and leaders; winzes sunk 196 ft., at places to connect the different levels; cross-cuts driven to the extent of 752 ft.; and old drives cleaned out and repaired for a distance of 1,950 ft. This company's prospects were very encouraging in the early part of the year, the first crushing of 200 tons giving a return of 401 oz. of gold; but since then the returns have become less, and for the last five months very little quartz has been crushed. 3,286 tons of quartz was crushed during the year for 1,580 oz. of gold, and an average of thirty-seven men has been constantly employed.

*Waiotahi Mine.*—This mine is still being continuously worked, and a fair amount of crushing-dirt is being produced from the various leaders that traverse the mine between Nos. 1 and 3 levels. The leaders being small, a large area of ground has to be stoped out to obtain the quartz, and in consequence the quartz must contain a considerable quantity of gold to pay. There has been 1,360 tons of quartz crushed for 1,917 oz. of gold, the value being £5,214 13s. 7d.; but as there has only been sixteen men employed, and as the mine is only worked on systematic and economical principles, a very small margin of profit has enabled the directors to pay a dividend of 2s. 6d. per share, making the twentieth dividend since the company was formed.

*Nonpareil Mine.*—This company had twelve men employed in the early part of the year, and for some time the prospects of the mine looked exceedingly encouraging. There was a large amount of prospecting done, but as sufficient gold was not obtained to meet the expenses the directors had the number of men reduced to two and portions of the mine let on tribute. The Liverpool Boys and Wade reefs were the principal reefs operated on, from which 153 tons of quartz was crushed for a yield of 412 oz. of gold, and 9 tons for tributers for 21 oz. 5 dwt.

*Moanataiari Mine.*—This company's operations during the year have been principally confined to development-work in the mine and the erection of the crushing plant. The main shaft has been sunk from No. 3 level another 100 ft., making the total depth of the shaft 503 ft. A chamber was opened out a few feet above the bottom of the shaft, and what is termed No. 4 level is being pushed on from here with all possible speed. Driving, stoping, and rising are proceeding in the various levels on the different reefs that traverse the property, but the greatest portion of the ore sent to the mill is at present coming from the Golden Age reef at the Point Russell level. The lode is from 8 ft. to 9 ft. in width, and has been opened to a considerable extent, but as some of the quartz is low-grade ore only 5 ft. to 6 ft. of the reef is selected and sent to the mill. In the intermediate level, 100 ft. below the Point Russell level, the Golden Age and Reuben Parr reefs junction, and here the reef has been driven on for a considerable distance. At No. 3 level of the main shaft the Cambria reef and leaders on the hanging-wall of the reef are being operated on. Specimen stone is frequently met with in the leaders, which indicates that something good may be obtained from the reef. At No. 1 level the Nos. 1 and 2 reefs were opened up to a great extent. A rise has also been put in from the main adit-level a distance of 210 ft. to connect with the upper levels, which is to be used for passing the ore down from the upper levels to the main level, thence it will be trucked direct into the mill. Pending the completion of the battery there has been very little quartz crushed this year from the mine. The first cleaning-up took place last month, with the result that 1,233 tons of quartz was treated for a return of 602 oz. of gold. 123 men are employed.

*West Coast Mine.*—This mine has been steadily worked during the year by the owner, John Northey. The work has been confined to working small stringers in surface-levels. During the year 29 tons of quartz was treated for a return of 24 oz. of gold. Two men are employed.

*Little Maggie Mine.*—This mine adjoins the Nonpareil mine, and is worked by the owner, William Britt, the work being confined to driving and stopping on small leaders and stringers. Two men are employed. During the year 15 tons was crushed for a return of 16 oz. 2 dwt. of gold.

*Infant Mine.*—This mine is also worked by the owner, J. Johnson, on small leaders and stringers, and 8 tons of stone has been crushed during the year for a return of 8 oz. 17 dwt. One man employed.

*Hauraki Golden Age Mine.*—This company has thirty-five men employed, and has in consequence done a large amount of work in the mine. The Golden Age has been driven on for a distance of 1,000 ft. Two winzes have been sunk 160 ft. from the Balmoral level to the main adit-level for ventilation. The reef runs from 12 ft. to 50 ft. in thickness, but the greater portion of it is and hanging-wall reefs have been driven on to a considerable extent, but nothing of a payable low-grade ore and appears not to be good enough to send to the battery for treatment. The No. 2 character has yet been discovered. A new twenty-stamp battery has been erected, and an aerial tramway to convey the quartz from the mine to the battery is nearly completed; but this work has been stopped, and the present operations are confined to the development of the mine.

A number of other mines have been worked during the greater part of the year, and a considerable amount of work done therein—viz., Moanataiari North, Freedom, New Whau, New Caledonia, Orlando, Caspian, Alburnia East, and Moanataiari Extended, but most of them are now under protection.

#### GRAHAMSTOWN DISTRICT.

*Victoria Mine.*—The operations in this company's mine in the early part of the year were chiefly confined to driving and stoping on what is termed the Victoria leader in the Prince Imperial section of the mine; but as the returns became smaller every month and were not payable, the number of men was reduced to four, who are prospecting at No. 2 level. 283 tons of quartz was crushed for 683 oz. 10 dwt. of gold. An average of sixteen men was employed.

*Cardigan Mine.*—There are five men employed by this company. The work done has been of a prospecting character, and the present work is driving on the Cardigan reef. No returns have yet been obtained.

#### WAIOKARAKA DISTRICT.

*May Queen Mine.*—This company have enlarged and retimbered the May Queen shaft, and as soon as the pumping machinery of the Thames Hauraki is fairly started, and the water drained from this part of the mine, the sinking of this shaft will be resumed for the purpose of opening up other blocks of ground on the different reefs, which are supposed to contain gold in payable quantities. A considerable amount of work in developing has been done in the Saxon section of the mine, and a leader about 1 ft. in thickness is being worked in the foot-wall of No. 1 reef, which has given payable results. 859 tons of quartz has been treated by the company for 924 oz. of gold, and 42 tons by tributers for 85 oz. 10 dwt. Fifty-two men are employed by the company, and six tributers.

*Thames Hauraki Company.*—This company has done a very large amount of work during the year on the different sections of their property, but the erection of the pumping machinery on the Queen of Beauty shaft has been greatly retarded lately by the pieces of machinery most urgently required not arriving from England. As the balance of machinery is expected to be all on the ground within the next two months, and as everything to hand is in position, it should only take a short time after the balance arrives to complete this important plant. At the Deep Sinker section the shaft has been sunk to a depth of 480 ft., and a level opened out at a depth of 460 ft., which



has now been driven a distance of 150 ft. The country is hard, and not all that can be desired for gold-bearing reefs, but a change of country may come in at any time. In the Deep Level Consolidated section of the property the adit-level has been driven towards the Hape Creek a total distance of 1,160 ft., but unfortunately nothing of importance has been discovered.

#### KARAKA DISTRICT.

*May Queen Extended Mine.*—Operations in this mine have been carried on during the year with from two to eight men employed, the principal work being driving and sinking on the reefs in the road-level from the Karaka Creek. During the year 39 tons was treated for a return of 44 oz. 17 dwt. of gold.

*Claremont Mine.*—This mine is worked by the owner, who directs his attention chiefly to working small leaders that junction with what is called flinties, and it is at the point where the flinties run into the leaders that the gold is found. 213 lb. of stone was treated during the year for 181 oz. 11 dwt. of gold.

*Manchester Mine.*—This mine has been worked by two parties of tributers during the latter part of the year. Swan and party, working the lower level section of the property, have cleaned out and retimbered an old level for a considerable distance, for the purpose of getting into a reef that has been worked on in the old workings, and from which they have had a crushing of 23 tons of quartz for a return of 27 oz. 6 dwt. of gold. Smith and party had also a crushing of 8 tons of stone from the reef in the higher section of the property for a return of 10 oz. 15 dwt.

*Gloucester Gold-mining Company.*—This company's property is undergoing vigorous prospecting. A considerable amount of trenching and driving has been done. A shaft has been sunk to a depth of 140 ft., and a whim erected for haulage purposes, but it is intended to replace this by a pumping- and winding-engine capable of sinking to a depth of 400 ft., or further if required. The foundations are to be built with concrete, and will be of a substantial character. The estimated cost of the engine, pumps, poppet-heads, engine-house, and everything complete will be about £1,950. This is one of the most promising properties in the Karaka Creek, and is being explored by an English Company, whose attorney in New Zealand is the Hon. William McCullough, M.L.C. The developing works are being carried out in a satisfactory manner under the supervision of Mr. Thomas McCullough. A fair quantity of gold has been obtained from time to time from the various leaders and reefs in the surface-drives, and there is every prospect of gold being got at a depth, as the parties who had previously worked on the property obtained gold as far as they were able with their primitive appliances to keep the water down. The Lincoln Special Claim has been secured by the company's attorney, and negotiations are proceeding for the purchase of the Manchester Claim. This should prove a valuable addition, as the Manchester tributers found a body of quartz 3 ft. wide, some of the ore from which has been tested as worth £2 15s. per ton by the battery treatment. Twelve men are employed.

*Adelaide Mine.*—A large amount of work was done in this mine in the early part of the year in opening up the main and cross reefs at the low level. The prospects at times were very encouraging, but after a considerable amount of money had been spent, and not sufficient gold being obtained to pay for the working of the mine, the claim was protected. 242 tons of quartz was treated for a return of 168 oz. 13 dwt. of gold. An average of twelve men was employed.

Prospecting works have also been carried on in the Karaka Queen, Lincoln, Duplex, and McIsaacs, all situated in the Upper Karaka.

*Karaka Mines (Limited).*—This company have done a large amount of work in the shape of driving and stopping. On the No. 1 reef 170 ft. has been driven on the reef east and 215 ft. west. The reef is about 2 ft. thick and the quartz looks promising, and nice gold is also occasionally seen in the stone. The mine is well timbered and the ventilation good. Seven men are employed.

#### UNA HILL DISTRICT.

*Occidental Mine.*—Six men have been employed in this company's mine. The operations have been chiefly confined to driving to cut the Loyalty reef, but as nothing of a payable character was discovered, and the funds became exhausted, the company applied for absolute protection for four months, which was granted.

*Fortuna Mine.*—Thirty-three men are employed. The company are vigorously pushing on with the development of the mine. The Gibraltar reef has been driven on for a distance of 175 ft. At the No. 1 level the reef is about 8 ft. thick, and I am informed gold has been occasionally seen in the quartz in breaking down. A winze is also being sunk on the foot-wall of the lode from this level to No. 4 level. Driving is also proceeding on the Magnolia reef at No. 3 level. This reef was 9 ft. thick where it was cut through, and has been driven on for a distance of 440 ft. and connected by a rise with No. 4 level. At No. 4 level six men are engaged driving on the Jupiter reef, which is 20 ft. thick and shows a little gold. The company has also erected a small pumping and winding plant on what is known as the old Dart shaft, and the water is now pumped out to the No. 3 level at a depth of 220 ft. The company's operations are now directed in opening up the low levels in this section of the property.

#### HAPE CREEK DISTRICT.

*Ethel Reefs (formerly Hauraki Anchor).*—This company has twenty-four men employed in opening up the reefs and leaders at the different levels from the side of the hill near the Hape Creek Road. Driving is proceeding east on the foot-wall of the Jupiter reef, which is about 20 ft. in thickness. In the Stephenson level four men are engaged in driving west on the Stephenson reef, which is 18 in. thick. In the east drive on this reef a winze is being sunk for the purpose of proving the value of the reef and making a connection with the old Anchor level for ventilation, which is to be repaired and afterwards used as a main level to work the various reefs at a depth. At the Prescott

level driving west is also proceeding on the Souvenir reef, which is 6 ft. thick, from which fair prospects are obtained. The Jupiter, Nellie, Stephenson, Fogarty, and Woolmer reefs have all been worked on more or less. This company has a new complete crushing plant, which it is intended to erect should sufficient encouragement be met with to warrant the outlay. 164 tons of quartz has been crushed for 89 oz. 4 dwt. of gold, and the tributers crushed 23 tons for 42 oz. 10 dwt. of gold.

*Mascotte Limerick Mine.*—A considerable amount of prospecting was done on this property in the early part of the year, but operations in the mine are now abandoned.

#### OTUNUI DISTRICT.

In the Otunui district very little work has been done during the year.

#### KIRIKIRI DISTRICT.

*Fleming's Mine.*—A little prospecting has been done, but I have heard of no important discoveries being made. It is intended to put up a small crushing plant to prove more fully the value of the ore before erecting a mill to treat on a large scale.

#### PURIRI DISTRICT.

*Empress of India Mine.*—A great deal of work has been done in this mine, and forty men were employed up to the beginning of April. 4,170 ft. of driving has been accomplished, the greater portion of which has been on the reefs, besides sinking winzes and other prospecting-works. The reefs and leaders traversing this property vary from 3 in. to 4 ft. The reefs driven on are not considered payable for the whole length, but some of the quartz assayed is stated to have given excellent results. The mine is well situated on the side of the hill, with every facility for working, and there would be no difficulty in constructing a ground or aerial tramway to convey the quartz, a considerable quantity of which is stacked at the different levels, from the mine to the mill. An option is at present held over the property by an English company, and it is expected that some decision will shortly be arrived at. No returns.

*Puriri Gold Estates (Limited).*—Extensive work has been done on this company's property in the way of surface-prospecting and road-making. Operations at the mine are confined to driving a low level from the side of a creek. Six men are employed at this drive, which is in a distance of 115 ft., and penetrating through very hard country. Favourable assays were obtained from the reef they are driving for, which was cut through on the surface.

The two mines mentioned are all the claims that are now being worked in the district.

#### NEAVESVILLE DISTRICT.

There has been very little work of any importance done in this district during the year.

#### TAIRUA DISTRICT.

*Broken Hill Mine.*—A very large amount of money had been spent on this property, but after purchasing a battery and making all necessary arrangements for its erection, with water-race and tramway to connect with the same, it was discovered that nothing of a payable character had been found to warrant the outlay, and all the works have now been stopped, pending instructions from the directors in London. Thirty men were employed. No returns.

*Albert Mine.*—This company has continuously worked its mine with seven men, and in consequence a good deal of work in the shape of prospecting has been done. The manager is sanguine as to the mine being of considerable value, but as yet nothing of importance has been discovered. For a time this mine was the only one in the district that was doing any work.

*Anglo-Continental Company.*—This company did a large amount of prospecting in this district, but, as nothing of importance was discovered, operations on the properties held by them were stopped, but I am informed they have again resumed work.

#### OHUI DISTRICT.

There were a number of men employed prospecting in this district in the early part of the year, but most of the claims are now protected. A six-stamp battery has been erected, but no returns have been received.

#### WHANGAMATA DISTRICT.

*Whangamata Proprietary Mine.*—This company has done a large amount of work, and the mine is now well opened up. The reef is about 7 ft. thick, and has been driven on in No. 1 level for a distance of 750 ft., and winzes sunk on it to connect with the bottom levels. A shaft is being sunk from near the top of the hill for the purpose of working the reef at a depth, and the different levels will be connected with the shaft.

The bottom level will be used for trucking the quartz out to the hopper; from thence it will be conveyed to the mill by a tramway. A contract for the excavating of the battery-site is now proceeding, and a water-race is also in the course of construction. There is something like 5,000 tons of quartz in the paddock ready to be sent to the mill, which, I am informed, contains gold in sufficient quantities to pay and leave a good margin of profit. Thirty men were employed during the year.

*Wentworth Mine.*—This company has nine men employed in the mine and seven men constructing a water-race, and it is intended to erect a battery. Two reefs are being driven on, which are about 2 ft. in thickness, and said to obtain gold in payable quantities. There has been little work done in the mine, as it was protected for six months during the year.

In the early part of the year extensive prospecting-works were carried on in the Phoenix, Golden Mount, Golden Falls, and several others; but operations in all the mines in this district have now been discontinued, with the exception of the Whangamata and Wentworth Mines, as already mentioned.

## OHINEMURI COUNTY.

## MARATOTO DISTRICT.

*Hikutaia Gold Syndicate.*—This company's mine is well opened up. The reef, which is from 6 ft. to 14 ft. in width, has been driven on at No. 5 level for a distance of 1,250 ft., and 600 ft. at the bottom level. Winzes have been sunk from one level to another, and in consequence the ventilation is all that can be desired. A considerable amount of prospecting has been done at the surface-levels with encouraging results. The ore, though of low grade, is said to contain gold in sufficient quantities to pay for breaking-out, crushing, and other expenses in connection with the working of the mine, and still leave a small margin of profit, and there is enough quartz in sight to keep a hundred stamps steadily working for years. Thirteen men are employed.

*Walker's Maratoto Mine.*—There has been a considerable amount of prospecting done on this property during the year, but no important discoveries have been made to warrant the erection of a battery. From five to sixteen men have been employed. No returns.

Prospecting operations in the Volunteer, Lord Salisbury, Retreat, and the other claims in this district have been suspended.

## KOMATA DISTRICT.

*Komata Reefs Company.*—This company has done a considerable amount of excellent work during the year. A twenty-stamp battery has been erected suited either for dry or wet crushing, with cyanide-vats and some of the latest appliances for saving gold. Dry crushing was tried for a while, but it was deemed advisable to try the wet-crushing process, as in some of the other mines in this district wet crushing was being carried on with similar ore, and is said to have given better results than the dry crushing, and this company is now satisfied the ore from their mine can also be more successfully treated by the wet process, which must be admitted is a great benefit to the men that have to handle the ore in the mill. The company considering there is sufficient ore in sight to warrant the outlay is also erecting another twenty stamps, with vats, &c., necessary to treat the stuff after passing through the stampers. The ore is conveyed from the mine to the mill by shoots and ground tramways, which act admirably. The mine is well opened up, and the reefs that are being operated on are the Komata, Argale, Hartridge, and the Lavington. The reefs vary from 9 in. to 8 ft. in thickness, and, as the ore fluctuates a good deal in value, it requires careful attention so as to save the portion that contains the gold in payable quantities; but there is no trouble in getting abundance of quartz to keep the mill constantly employed. During the last five months 2,380 tons of quartz was treated, for 10,628 oz. of bullion, valued at £8,018 13s. 1d. One hundred and four men are employed in the mine and mill.

A large amount of prospecting-work was done in the early part of the year in the Komata Queen, Komata Amalgamated, Byron Bay, and several other claims in the district, but operations in those mines have ceased for the present.

## KARANGAHAKE DISTRICT.

*Woodstock Gold-mining Company.*—This company has done a large amount of work during the year, and it is to be regretted that owing to the long drought the mill has only been worked intermittently, thereby causing considerable loss to the company. Experiments in wet crushing at the battery have given satisfactory results, and in consequence the forty head of stamps will be converted to wet crushing during the next few months. In the No. 1 level, Marie lode, the reef has been driven on for a distance of 550 ft., and is said to contain gold and silver in payable quantities. At the intermediate level the reef has been driven on south of the cross-cut for a distance of 350 ft., and is connected by rises with No. 1 level, the vertical height of the block being 120 ft. between the two levels; the lode is 4 ft. in width, and is of a payable nature throughout. The Marie reef at No. 2 level has been driven on for a distance of 810 ft.; here the lode varies from 4 ft. to 5 ft. in thickness, but the bulk of it is of good quality, and it is all sent to the mill for treatment. The cross-cut west at this level has been driven a distance of 700 ft., and five distinct reefs have been cut through, carrying more or less gold and silver. The principal lode is known as Shepherd's, and is about 12 ft. in thickness. A considerable tonnage of quartz has been crushed from here, giving good payable results. The Marie reef has been driven on at No. 3 level for a distance of 950 ft., and has varied from 3 ft. to 15 ft. in thickness, carrying a high percentage of the precious metal. At No. 4 level the Marie lode has been driven on for a distance of 684 ft., from which good crushing-ore is being obtained. The cross-cut west at this level has been driven a distance of 400 ft.; this drive is being put in for the purpose of intersecting the Woodstock lode which runs parallel with the Marie lode, and at the point where the lode is cut at this level there will be 380 ft. of backs. 11,355 tons of quartz was put through the mill during the year, for 52,454 oz. of bullion, to the value of £35,172 7s. Two hundred and one men were employed.

*New Zealand Crown Mines.*—This company have done a very large amount of work during the year on what is considered outside work. A water-race has been constructed a distance of  $1\frac{1}{4}$  miles to convey the water from the Waitawheta Stream to drive the air-compressing machinery for working the rock-borers in the mine and the pumping and winding plant, which are all erected in large chambers cut out in the rock at the mouth of the low level. The company are also erecting another forty head of stampers, which will be completed in the course of a few months, when they will be in a position to treat double the quantity of ore that they are doing at present, with very little extra expense. The different works in the mine are being pushed ahead. No. 4 level is in a distance of 1,960 ft., and is still being extended in a southern direction on the reef, and stoping operations are also proceeding over this level. In No. 6 level the reef has been driven on for a distance of 1,860 ft.; the reef is, on an average, about 8 ft. in thickness, and is all being broken out and sent to the mill for treatment. Fifty-two men have been employed in driving and stoping over this level. At one place in the level underhand stoping has been carried along the bottom of the

level a distance of 80 ft. and to a depth of 50 ft. The reef is 14 ft. wide in lower workings, and is stated to be worth £5 per ton. Two hundred and ten men are employed. 16,989 tons was treated during the year, for 20,792 oz. 10 dwt. of gold, valued at £41,120 2s. 2d.

*New Zealand Talisman Mine.*—This company has done a very large amount of work during the year. The mine is opened up by seven drives from the side of the hill, the distances between the drives varying from 70 ft. to 123 ft. As the reef has been driven on in some of the levels for over 500 ft., and is from 3 ft. to 5 ft. in thickness, it shows there is abundance of quartz in sight to keep twenty stamps constantly crushing for some considerable time. Driving and stoping on the reef in the upper levels has been the principal work carried on, and, as there was a large amount of quartz stacked at the mouth of the different levels ready for treatment, there was no necessity to employ many men to keep the mill going; and owing to the long drought for the last three months there was not sufficient water in the race to keep the full number of stamps employed, consequently the yield of gold has not been as large as it otherwise would have been if the battery had been fully engaged. The reduction plant consists of two rock-breakers of Blake type, one revolving ore-drier, ten heads of 850 lb. stamps, ten heads of 1,000 lb. stamps, one No. 5 Krupp ball-mill, two wooden cyanide vats—16 ft. diameter, 4 ft. deep; amalgamating tables, six berdans, and the usual accessories, the machinery being operated by means of two Victor turbines. The works and offices are electrically lighted. For the last nine months 4,194 tons of quartz has been treated, for 15,225 oz. of bullion, valued at £13,681 7s. 3d. Seventy men are employed.

*Talisman Extended Mine.*—This mine has been continuously worked during the year, the principal work being driving a low level to intersect the Talisman reef. This drive is in a distance of 780 ft., and it is expected the reef will be met within the next 100 ft. of driving. A considerable amount of surface-prospecting has been done on the ground, and leads cut varying from 1 ft. to 4 ft. in width, but nothing discovered that can be considered payable. Four men are employed. No returns.

*Imperial Mine.*—A considerable amount of work has been done on the reef at Nos. 1 and 2 levels. The reef is about 2 ft. thick, and in places in the levels the prospects met with were exceedingly encouraging, but as the country has been disturbed, and the reef cut out by breaks, it is difficult to follow the reef. A low level has been recently started to cut the reef at a depth. Five men are employed.

*Woodstock Main Reefs.*—This company has employed twenty men, and in consequence has done a large amount of prospecting. The mine is opened by drives from the side of the hill. The No. 6 level has been driven for a distance of 628 ft., and the reef has varied from 3 ft. to 14 ft. in width, but most of the quartz is low grade, and not of a payable character. The No. 3 (Ivanhoe) level has been driven 600 ft., but, owing to no discoveries of a payable nature being made, the company has decided to stop operations.

The Stanley, Sterling, Waverley, Golden Fleece, St. Patrick, and Crown Imperial have done a good deal of prospecting, but, as no rich discoveries have been made, most of the claims have been protected.

#### OWHAROA DISTRICT.

*Ohinemuri Syndicate Mine.*—This company has erected a pumping and winding plant on their shaft between the road and river, near the Smile and Fortune battery. A shaft 12 ft. by 6 ft. in the clear has been sunk to a depth of 143 ft., and a chamber opened out at a depth of 120 ft., from which two cross-cut drives are being driven. The north cross-cut is in 100 ft., and the north-west cross-cut 115 ft. The Radical reef is expected to be cut at any time, but the intention of the company is to extend those cross-cuts for the purpose of intersecting any reefs that may traverse this portion of the property. Twenty-one men are employed. No returns.

There was some work done on Heightman's Freehold in the early part of the year, but for several months past there has been no work done in any of the mines in this locality.

#### WAIHI DISTRICT.

*Waihi Gold- and Silver-mining Company.*—The operations of this company consist principally of driving and stoping in the Martha, Welcome, and Victoria lodes, which are supplying abundance of quartz to keep the mill constantly crushing. From the stopes on the Martha lode over No. 2 level the ore coming to hand is of excellent quality, and the reef looks well. The Victoria lode at No. 2 level is producing a fair quantity of ore of medium quality, the width of the lode being 6 ft. in the face. From the Welcome lode at No. 2 level the ore for the whole width (14 ft. 6 in.) is of good quality. The stopes opposite No. 1 shaft on the same reef are supplying first-class ore, the lode at this place being 6 ft. wide. At the No. 1 level on Welcome lode, in the western end, there is an improvement in the quality of the quartz, and the lode is 5 ft. in width in the face. Owing to the face of this drive being in a distance of 2,200 ft. from No. 1 shaft it has been decided to suspend operations here until No. 2 shaft is available, or a connection made with No. 3 shaft. A cross-cut has been accordingly started from the south-eastern side of the level for the purpose of connecting it with No. 3 shaft. The Surprise lode at No. 1 level, which is about 12 in. wide, has been driven on for a distance of 132 ft. During the past few weeks good progress has been made with the sinking of No. 2 shaft, and it has been sunk below the point where No. 4 level is to be opened out. The No. 3 shaft has attained a depth of 100 ft. below the surface, and three small lodes have been cut through in this shaft, varying from 15 in. to 24 in. in width, all of which contain a fair percentage of gold. The new Victoria battery at Waikino commenced crushing on the 25th February with fifty heads of stamps, and, with the exception of trifling details, everything in connection with this portion of the plant worked very satisfactory. 37,164 tons of quartz has been crushed and treated during the year, for 126,801 oz. of bullion, valued at £134,533 8s. 9d. As the mine is well opened up and abundance of quartz in sight to keep both batteries fully employed, it may be fairly expected that, should no serious thing happen whereby any of the batteries may be stopped, the return of gold from this mine next year will be about double that of the past year.

The first crushing of the two batteries for the month of April, 1898, has been received, which shows that 5,660 tons of quartz has been treated, for 18,361 oz. of bullion, valued at £18,445 2s. 5d. There are five hundred men employed by this company; three hundred and ten in the mine, the balance at the batteries and surface-works.

*Union Mine.*—This company has seventy men employed. The operations in the mine are chiefly confined to development-work. The main shaft is 14 ft. by 6 ft. in the clear, and has been sunk to a depth of 300 ft. From this shaft three levels have been opened out, and a large amount of work done in the shape of driving. The principal work is on the Union reef, which varies from 3 ft. to 6 ft. in thickness, and is said to contain a fair percentage of the precious metal. Work is also proceeding on the Amaranth reef, which varies from 12 ft. to 30 ft. in thickness. Assays made of some portions of the reef give payable results. In the Winner section of the mine a cross-cut drive is being driven from the whim-shaft to intersect the Winner reef.

*Waihi-Silverton Gold-mining Company.*—This company has done a large amount of driving and stoping at Nos. 1 and 2 levels, and the shaft has been sunk to a depth of 250 ft., where a chamber was opened out, and a cross-cut driven to intersect the reef. Driving is now proceeding on the reef north and south. The reef at this level is about 7 ft. in width, and, although it is low-grade ore, yet it is said to contain gold in payable quantities. The shaft is also being sunk below No. 3 level, for the purpose of opening up another level with all possible speed. The forty-stamp mill has been continuously employed. 11,253 tons of quartz has been treated for 8,456 oz. of bullion, valued at £16,452 4s. Seventy men have been employed.

*Waihi-Gladstone Mine.*—A large amount of prospecting, &c., has been done in this mine during the year. A shaft 6 ft. by 3 ft. in the clear has been sunk to a depth of 175 ft. The reef has been driven on for a considerable distance at No. 1 level, and a winze sunk to a depth of 65 ft. The reef is about 6 ft. in width, and, although a considerable portion of it is low-grade ore, yet samples taken from several places have given good results. The mine is at present protected pending instructions from England. Nine men have been employed. No returns.

*Waihi Consolidated Company (Favona and Brilliant Mines).*—This company have completed the erection of their pumping and winding plant mentioned in last year's report, and are now pushing on with the development of their mine, and the prospects met with are considered fairly satisfactory. At No. 1 (200 ft.) level driving is proceeding on the reef, which is about 4 ft. in width, and is said to give good results by assay tests made of some of the stone. In the northern face the reef is slightly disturbed, but this is probably on account of the workings being so near the surface. Good progress is being made with the sinking of the shaft below No. 1 level, which is penetrating through an excellent channel of country. Seventeen men are employed. No returns.

*Grand Junction Mine.*—This mine comprises two blocks of land. The Grand Junction is situated on the north-east of the Waihi Company's mine, and the Waihi West section on the south-west of the Waihi Company's mine. The Grand Junction shaft is 503 ft. deep, and a chamber opened out at a depth of 494 ft., and from this chamber cross-cut drives have been driven north and south. In the cross-cut north, at a distance of 411 ft. from the shaft, a large body of ore was met with, supposed to be the Martha lode, but owing to the large amount of water that was tapped when the reef was cut the pumps were not capable of dealing with it, and it was deemed advisable to build a dam in the cross-cut to prevent the water finding its way to the shaft until a larger pump was put in, consequently this drive was stopped pending the alterations. The south cross-cut has been driven a distance of 200 ft., but nothing of importance has been met with. Work at the main shaft has been suspended with the exception of working the pumps eight hours a day. The company decided to sink a prospecting shaft on the line of reef to the north-east of the main shaft for the purpose of intersecting the reef and working it at a higher level to prove its value. The shaft is now down a depth of 250 ft. Two cross-cuts are being driven from the bottom north and south, and are in a distance of 25 ft. both ways. According to the supposed line of reef on the surface it should be intersected in about 30 ft., but should it not be met with in this drive it is intended to sink the shaft for another level. In the west section No. 2 shaft is being sunk with temporary sinking plant. It is down to a depth of 190 ft., and at 160 ft. connection was made with the cross-cut driven from the No. 1 shaft, where the reef met with was supposed to be the Martha, being 18 ft. in width where intersected. It is now the company's intention to sink 100 ft. from the 160 ft. level before opening out, so as to render available a quantity of backs. Thirty-eight men are employed.

*Waihi Consols Mine.*—This company has done a considerable amount of prospecting, and has lately erected a small engine on the shaft for the purpose of proving more fully the ground at a depth. As this mine is situated on the west of the Waihi Grand Junction, or Waihi West, the ground may be considered to be in a favourable position and worthy of further prospecting. Ten men were employed. No returns.

*Waihi South Mine.*—This mine adjoins the Waihi Consols, and is to the south of the Waihi West Claim. A shaft has been sunk to a depth of 220 ft., and two cross-cut drives have been driven from the shaft in a northerly direction towards the boundary of the Waihi Consols Claim, but in both cases nothing of importance was discovered, and the claim is now protected. Thirteen men were employed. No returns.

Prospecting operations were carried on to some extent in the early part of the year on the Waihi Monument, Great Northern, King of Waihi, Mataura, Waihi Golden Pinnacle, Waitete, Waitete Extended, Waihi Proprietary, and Queen of Waihi.

#### WHAREKIRAUPUNGA.

*Royal Standard Mine.*—This company has done a large amount of work during the year. A tramway has been laid from the landing in the river to the mine, a distance of about four miles and a half, and only requires some ballast in places to complete this great work. An excavation has been made for the battery about three-quarters of a mile from the mine. The construction of a

water-race is in a forward state, and the manager's house, offices, store-house, &c., are all built suitable for a large company's business, and Mr. Pascoe, the manager sent from England, considers there is nothing in the mine to warrant the outlay, and in consequence has recommended the directors to stop all works until the matter is fully considered. It is said £23,000 have been spent on various works connected with the mine.

#### WAITEKAURI DISTRICT.

**Waitekauri Mine.**—The various works in this company's mine are proceeding very satisfactorily. At the Kilu level the reef has been driven on for a distance of 650 ft. The No. 1 shaft is down a depth of 320 ft., and it is intended to sink to a depth of 330 ft. before opening out for the next level. Driving and stoping operations are proceeding on the reef above Nos. 1 and 2 levels. The No. 2 shaft is down 195 ft., and a chamber is opened out at 185 ft., and from this chamber a cross-cut drive is being put in to intersect the reef. It is intended when the proper level is attained in the shaft to drive a cross-cut to meet the Socket tunnel, which is in a distance of 1,800 ft., and which is being pushed on with all possible speed, but there is yet 4,364 ft. to be driven from the face of the tunnel to the No. 2 shaft. Owing to the large quantity of water met with in the cross-cut at No. 1 level in No. 2 shaft, operations in this level were suspended for a time, as the engine could not pump fast enough to keep the water down, but this was only till the water drained off the reef. In the Waitekauri section four men are driving to connect with the New Zealand Jubilee workings for ventilation for both mines.

**Te-Ao-Marama Section:** The company has decided to thoroughly develop this section of the property. Twenty-four men are now employed here, but this number is likely to be increased greatly. A shaft has been commenced on the side of the hill, which is to be sunk to a depth of 600 ft., and when this depth has been attained it is intended to open out and drive to meet the low level that is being driven from the Grace Darling Creek. The whole of the company's properties are being systematically developed, and are giving employment to a large number of men. 21,708 tons of quartz has been treated for 46,076 oz. of bullion, valued at £50,528 8s. 11d. Three hundred and twenty men are employed on the different sections of the property.

**New Zealand Jubilee Mine.**—Forty men are employed in this mine. In No. 2 level, which is 78 ft. below No. 1, there are twenty-four men engaged in driving and sinking operations. They are sinking a shaft from this level at a distance of 600 ft. from the mouth of the tunnel, which is in 1,000 ft. This level is being driven south-east to intersect the Waitekauri reef, which they expect to cut after 80 ft. more has been driven. What is supposed to be a dropper from the reef, about 7 in. in width, has been cut, and looks very promising. It is intended to connect this level with the Waitekauri workings on the reef for the purpose of securing natural ventilation. There are sixteen men engaged in connection with the sinking of the shaft and the erection of the machinery. The shaft, which is 9 ft. by 4 ft. in the clear, having already attained a depth of 50 ft. A large chamber has been cut out in this level, and poppet-legs erected over the shaft, which is to be worked by two small Tangye boilers and engine, which are in position and ready to start in a few days. A rise has been put through to No. 1 level to carry off the smoke and steam. The chamber is 32 ft. long, 16 ft. wide, and the main sets, 17 ft. high, and is securely timbered. The shaft is going down on the foot-wall of Christie's reef, and it is also intended to intersect the Waitekauri reef from this shaft at a depth of 300 ft. At a low level there are nine men engaged driving on the reef; the drive is in a distance of 1,400 ft., the width of the reef being from 3 ft. to 4 ft. No returns.

**Waitekauri United Gold-mining Company.**—This company has done a very large amount of driving and prospecting. The No. 1 level has been driven a distance of 1,500 ft., and No. 6 level, from the western side of the hill to meet No. 1 level, has been driven 350 ft., but as nothing of any importance was met with for the whole of the distance the company obtained absolute protection, and operations in the mine have been stopped for the present. No returns.

**Waitekauri Union Mine.**—Western Section: There are nineteen men employed on this section of the company's property. The main low-level tunnel, which is in a distance of 530 ft., is going on as fast as possible, but the country is very hard, which makes the progress rather slow with hand-power. The level is driven with the intention of cutting the Te-Ao-Marama reef at a distance of 1,500 ft. from the mouth of the tunnel. An air-compressor engine is to be placed close to the mouth of the tunnel for the purpose of working the rock-drill, which will expedite the driving of the level. A considerable amount of surface-work, road-making and excavating for plant, now nearly completed, has been done, and it is expected that the engine will be running in the course of a few days. The shaft has been sunk to a depth of 180 ft., and a small pumping and winding plant was erected on this shaft, but it was found the engine and pumps were not large enough to compete with the water, and work has been stopped on this section pending the arrival of a larger pumping plant. No returns.

**Grafton United Gold-mining Company.**—This company have eight men employed. The principal work is driving the low level, which is being pushed on with three shifts to intersect the Golden Cross reef. They are in a distance of 550 ft., and expect to cut the reef in another 100 ft. The drive is at present penetrating a rather tight class of country. No returns.

**Alpha Gold-mining Company.**—This company have thirty-two men employed, and intend to thoroughly open up the reefs at various depths. The indications are of an encouraging nature, and there is a fair body of stone which prospects well. There are four different levels working at present, twenty-eight men being engaged underground. The low level is in 227 ft., and is being pushed ahead vigorously with three shifts. No. 5 level, which is 100 ft. above the low level, is in a distance of 32 ft. No. 4, which is 100 ft. above No. 5 level, is in 274 ft., and there is a rise through on to the surface for a distance of 98 ft. All these levels, including the western recently started, are being expeditiously pushed ahead so as to have them connected, and the reef will be opened up by the time the battery is erected. The company have decided to erect a twenty-head mill for wet crushing, to be worked by steam-power. All the necessary excavations for the battery-site are nearly com-



pleted, and the manager is now anxiously waiting for the completion of the road so as to get the machinery on the ground before the wet weather sets in. No returns.

*Waitekauri Reefs Company.*—Six men are employed on this company's grounds, four of them being engaged in cleaning out and retimbering the Stevens's No. 2 level for the purpose of extending it to intersect the Waitekauri South No. 2 reef. In the low level of the British Empire section two men are driving on the reef, which averages about 2 ft. 6 in., but the ore, though of a kindly quality, is not so far considered payable. No returns.

*Young New Zealand Mine.*—Five men are employed cleaning out and retimbering the low level, which is in a distance of 460 ft. It is intended to extend this level with the view of intersecting a series of reefs cut and worked at the higher levels, the principal object being to get under the Welcome reef, where a considerable run of gold was obtained in the early days. About 200 ft. more will have to be driven to reach the desired point. This will give 100 ft. of backs on the reef to the next level. A start has been made with a rise through from this level to the surface for the purpose of ventilation, which is rather defective at times. No returns.

*Grace Darling Mine.*—Five men are employed in this mine rising on the reef to the surface from the No. 2 level and timbering the No. 2 level for the purpose of stoping the reef south. The reef, which averages 5 ft. in width, has been driven a distance of 400 ft. to the south, this block being intact to the surface and ready for stoping. The reef has been driven on north to the surface, a distance of 300 ft., a good deal being stoped at this end. All the ore broken down is saved for treatment. It is intended to make some slight alterations and repairs to the battery before putting any more ore through it. The reef looks encouraging, and with proper treatment the ore should be payable. Returns, 50 tons for 58 oz. 12 dwt. of gold.

*Waitekauri Junction.*—There are four men working in this mine. They are driving a low level from the creek to intersect a reef trenched on the surface and from which prospects have been obtained. The level is in a distance of 60 ft., and about 40 ft. further will have to be driven in order to cut the reef at a depth of 45 ft. below where it is trenched. No returns.

*Waitekauri Extended Gold-mining Company.*—This company have twenty-eight men employed—seventeen underground and eleven on the surface; but this number will shortly be increased, as tenders have been called for sinking, and driving two or three extra faces. The principal work at present is driving the low level, which is in a distance of 820 ft. There is still 300 ft. to drive in order to cut the reef, which has been driven on in No. 2 level for a distance of 500 ft., and averages 30 ft. in width. Cross-cuts have been put in at intervals of 50 ft. along the reef, which runs north and south, 280 ft. of backs being available between the low level and No. 2 level, where sinking operations are to be proceeded with on the reef in order to make connection with the point at which the low level will intersect the reef. It is intended to make this connection before commencing to crush permanently, as the ore can then be passed through from Nos. 1 and 2 levels, connecting with the hopper to be erected at the terminus of the aerial tramway, and brought in direct contact with the battery, thus obviating the necessity of sending the ore by a ground tramway from the mines to the kilns, a distance of half a mile, and from the kilns to the battery by aerial tramway for three-quarters of a mile. If the dry crushing is maintained, a rotary furnace will be erected at the battery for the purpose of roasting the ore, saving a good deal of handling, and doing away with the kilns, which cannot be worked satisfactorily in wet or windy weather, as the ore is either damped or the lighter portions blown away while in transit to the mill. The battery, when completed, will consist of forty heads, twenty heads being already in position. A few tons of ore were put through these stamps, but, as the water-supply was short, and several alterations and adjustments were necessary, the battery will not resume crushing for some time. Experiments will be conducted with wet and dry crushing in the meantime, and the connection of the levels will be pushed ahead. It is intended to put through the mill 600 tons of ore as a test, 300 tons to be treated by dry crushing, and 300 tons by wet crushing. Every alternate truck of the ore broken from the reef will be tipped into a hopper for wet crushing, and when the results have been definitely determined the battery will be completed and fitted up for the process found most suitable and economical for the treatment of the quartz. Although the ore is of a low grade, there is an immense quantity of what is considered payable material available. No returns.

*Waitekauri Cross Mine.*—Eight men are at present employed, and are principally engaged in sinking an underlay-shaft on the reef in the low level at an incline of 76 deg., a depth of 100 ft. having been already attained. The low level is in a distance of 900 ft.—600 ft. along the reef. The shaft is being sunk on the reef at a distance of 500 ft. from the mouth of the tunnel. When a depth of 300 ft. is sunk it is intended to open out on the reefs north and south. This will give a large quantity of backs, as well as prove the quality of the reef to a depth. A chamber is being cut in the level near the shaft for the purpose of erecting pumping and winding machinery, the motive-power for which will be supplied by electricity, generated on the Maratoto side of the range, where the company have constructed water-races for a distance of 100 chains. One of the races has been completed, and all the benching on the second race is finished, but the ditching has not yet been done. The necessary buildings for the electric plant have been erected, and power will be transmitted by cable over the range, a distance of two miles; but they are waiting the arrival of some important portions of the machinery destroyed by the fire on Auckland Wharf. The reef, which has been driven on to a considerable extent, is a very large ore-body, varying from 14 ft. to 60 ft., giving an average width of 20 ft. throughout; it is of low-grade ore at the depth driven on, but seems to improve in quality as it goes down. No returns.

#### TE AROHA AND WAIORONGOMAI.

*Te Aroha Gold-mines (Limited).*—The principal work carried on by this company during the year has been driving the main low-level tunnel, which is now in a distance of 1,230 ft. The tunnel was commenced very large, and after driving a few hundred feet it was deemed advisable to reduce it in size, and it is now being driven 8 ft. by 8 ft. in the clear, and owing to the nature of the country most of it had to be timbered. It has been driven for a considerable distance on

the foot-wall of the reef, and the reef has been cut through at four places and found at each place to be a strong body of quartz, but low-grade ore. There has been a Riddler air-compressor erected, at a cost of £2,630, near the mouth of the tunnel, for driving the rock-drills. A high-level water-race, capable of carrying seven sluice-heads of water, has been constructed for a length of 64 chains, which cost £1,100, while a penstock and 1,300 ft. of 14 in. steel pipes has been laid down from the bottom end of the race to the air-compressor, at a cost of £1,352. In the Colonist section 400 ft. has been driven, and 279 ft. has been driven on the Silver King reef; in all, 1,558 ft. has been driven, for a total cost of £9,500.

*Great Western Mine.*—This company has erected a small crushing plant to treat the ore at the mine, as assays taken from the reef were sufficient to warrant the outlay. The reef varies from 2 ft. to 12 ft. in thickness, and was formerly known as the No. 2 New Find, Waiorongomai. Thirty-four men have been employed.

*Loyalty.*—Two men have been constantly employed in this mine, and there is 50 tons of quartz in the paddock ready to crush, which is said to be worth £6 per ton.

*Grand Result.*—This company has 50 tons of quartz broken out, and which is to be sent down to the Montezuma plant as soon as the County tramway is put in repair.

*Montezuma.*—Four men are driving the No. 2 level in the Waterfall reef, which is about 2 ft. 6 in. in thickness, but of rather poor quality. The drive is in a distance of 250 ft. Operations are also being carried on in the Waitara and Plutus sections of the mine.

The Thermo-hyperphoric reduction plant is approaching completion under the superintendence of the Rev. Joseph Campbell. The cost of treatment of the ore from the time it is delivered into the mill is estimated by the Rev. Mr. Campbell at not more than 8s. per ton, and, as it is anticipated 95 per cent. of the bullion will be saved, it should prove a cheap method of treating the ore.

#### TAUBANGA COUNTY.

##### KATIKATI DISTRICT.

A number of claims have been taken up, but only four men are prospecting, and no important discoveries have been made.

I have, &c.,

JAMES COURTTS, Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

#### ACCIDENTS IN GOLD-MINES.

Name.	Mine	Nature.	Date.
* John Childerhouse ..	Nonpareil, Thames ..	Fatal accident, by a stone falling from the roof of the drive	13 May, 1897.
George March ..	Grand Junction, Waihi ..	Stuck the pick into his foot	30 Mar., "
Richard Owen ..	Moanataiari Mine, Thames ..	Fell from the roof of building, fracturing his skull	8 May, "
William R. Young ..	Hauraki Mine, Coromandel ..	Detonator went off when in the act of putting it in the fuse: hand hurt	4 June, "
Thomas Moore ..	Mariposa Mine, Kuaotunu ..	Shot went off while charging a hole: hand hurt	8 " "
Thomas Dick ..	Grand Junction Mine, Waihi ..	Forefinger broken by a crane	24 July, "
M. Mainwaring ..	Talisman, Karangahake ..	Hurt on the tramway	30 " "
George Cleave ..	May Queen, Hauraki, Thames ..	A piece of stone fell down a rise, striking him on the head	5 Aug., "
M. Taylor ..	Union Beach Mine, Coromandel ..	In changing a bucket got his arm broken	17 " "
* John Wood ..	Waitekauri Battery, Waitekauri ..	Fatal accident: dragged round on the shaft of the roller-mill	18 " "
Charles Adams ..	Kapai-Vermont, Kuaotunu ..	Dislocated his shoulder when trucking	27 " "
Alexander Gemmel ..	Kapai-Vermont, Kuaotunu ..	The point of his finger taken off in battery	20 " "
James Trayes ..	Waihi-Silverton, Waihi ..	His arm broken going down the shaft on the cage	11 Sept., "
John Hutton ..	Waihi Mine, Waihi ..	Shot went off, injuring him	8 Nov., "
Henry Jury ..	Kuranui-Caledonian, Thames ..	Slipped off a ladder going up to stopes, injuring his side	8 " "
Adam McConnell ..	Kauri Freehold Gold Estates, Opitonui ..	His thigh broken by a piece of mullock	2 Dec., "
Albert Whitely ..	Waihi Mine, Waihi ..	His arm broken shunting a truck	9 " "
Thomas O'Loughlin ..	Waihi Mine, Waihi ..	Leg sprained by falling 20 ft. in No. 2 shaft	5 Jan., 1898.
George Barry ..	Grafton United, Waitekauri ..	Hand slightly injured by explosion of detonator	10 " "
* A. J. Foard ..	Golden Cross, Waitekauri ..	Fatal accident: killed by falling down No. 1 shaft	15 Feb., "
Fred Hamlon ..	Woodstock Main Reefs, Karangahake ..	Little finger taken off with the fan	7 Jan., "
Matthew Cahill ..	Waiotahi Mine, Thames ..	Hurt by slipping on a ladder	11 Feb., "
Archibald Kerr ..	Woodstock Main Reefs, Karangahake ..	Little finger taken off with fan	16 " "
Peter Weir ..	May Queen Battery, Thames ..	Three fingers crushed with the stamps	2 Mar., "
John Carroll ..	Waihi Mine, Waihi ..	Sprained ankle slipping on ladder	12 " "
Ben Lason ..	Komata Reef, Komata ..	Head cut by falling down a pass ..	21 " "

\* Fatal.

There were three fatal accidents in this district during the year, and Richard Owen has not recovered from the injuries he received whilst at work at the Moanataiari battery. The other accidents were not of a serious character.



## No. 16.

Mr. R. TENNENT, Inspector of Mines, to the UNDER-SECRETARY for MINES, Wellington.  
SIR,— Inspector of Mines' Office, Westport, 23rd April, 1898.

I have the honour to report as follows on the gold-mines in the Marlborough, Nelson, and West Coast Districts, for the year ending the 31st March, 1898:—

## WAKAMARINA.

*Golden Bar and Ravenscliff Quartz-mines.*—(18/11/97): On my arrival at the Wakamarina I was reliably informed that mining operations at these mines had ceased for a considerable time.

## COLLINGWOOD.

*Parapara Hæmatite-works.*—(6/11/97): The hæmatite-works, owned by Messrs. Washbourne, are situated on the Parapara Stream, six miles from Collingwood. They have a six-head battery, each stamp being 750 lb. in weight, with berdans, drags, &c., the motive-power being supplied by a 30 ft. diameter water-wheel. The output averages 80 tons per annum, and the hæmatite, which is put up in 28 lb. bags, finds a ready sale in Nelson at £12 per ton. Preparations are now being made for the manufacture of a knife-polish powder. Five men employed.

*Golden Ridge Mine.*—(31/10/97): No. 1 level has been driven along the reef, which averages from 1 ft. to 4 ft., for a distance of 400 ft., and the quartz is stored at the mine-mouth, ready for milling operations. In the No. 2 level a cross-cut has been driven 50 ft., through a mixture of slate and sandstone. The drive along the reef is in about 360 ft. The reef, which carries a very good foot-wall the greater part of the way, varies in width from 1 ft. to 6 ft. The reef runs north-north-west and south-south-east, with a strong underlie to the west. Twelve men are employed in the two drives, which are well timbered, and ventilated by a rise from No. 2 to No. 1 level, the distance being 50 ft. The quartz from these workings is stored in a paddock ready for crushing. The battery, which is nearly completed, consists of twenty stamps, each 9 cwt., and four 4 ft. 6 in. berdans. The plant will be very complete, and the building is of a substantial character. Water will be used as the motive-power, and all the fluming in connection with the races is completed. The water will be conveyed through a tunnel 999 ft. in length, twelve men being employed, and the air for the tunnel is supplied by a water-blast. The aerial tramway is nearly completed. The works are being carried out under the superintendence of Mr. Richmond Hursthouse, the general manager of the Golden Ridge Gold-mining Company.

*Taitapu Gold Estates.*—(30/10/97): On the No. 2 block, where twelve men are employed underground, and two men on the surface making tracks, the outcrop of the reef can be traced for three miles, it runs in the same auriferous belt as the Golden Ridge Mine. The reef has been tested by a winze 120 ft. in depth, and averages from 4 ft. to 6 ft. in width. Where the reef was intersected by No. 1 cross-cut at 100 ft. the reef has been followed north 250 ft. and south 100 ft. The quartz is stacked at the mine-mouth and top of the winze ready for milling. In the No. 3 block the outcrop of the reef is 5 ft. wide, and pieces broken from it showed gold freely. No. 1 cross-cut is in 120 ft. The reef where intersected is 4 ft. wide, and lying very flat. Driving on this reef has been continued 120 ft. south and 147 ft. north. The reef prospects well, and varies from 4 ft. to 6 ft., carrying a good foot-wall. The cross-cut from No. 2 or low level is driven 310 ft., the ground being very wet; a reef may be expected at any time. The ventilation is supplied by a water-blast having 120 ft. of fall. Twelve men are at work on this section and eight men prospecting for outcrops of reefs. There are 126 men employed by the company on the various works on hand. Mr. F. H. Johnston has charge of the operations of Nos. 2 and 3 blocks. There are three other companies—the Australian Gold Trust, Pioneers of New Zealand, and the London West Australian Syndicate—prospecting on the company's property, and are reported to be meeting with very encouraging results.

*Red Hill Syndicate.*—(4/11/97): This company holds an area of 100 acres situated six miles south-west of Collingwood. At time of visit no men were at work, the mouth of the tunnel having caved in.

## LYELL.

*Alpine Extended.*—(19/8/97): After the amalgamation of the United and Lyell Creek properties mining operations were chiefly confined in forming direct communication between the two mines. This work was accomplished by the extension of No. 10 south level to meet the north winze from No. 9 Alpine. The ladder-way in the winze between Nos. 9 and 10 is completed, and the level securely timbered; ventilation good. On the east cross-cut six men, in three shifts, have driven 10 ft. and met with the hard hanging-wall. The west cross-cut is still being carried forward, and quartz boulders are met with; timber is well forward on the working-face. The south level is pushed forward with three shifts on the track, and a fine belt of stone forms the roof of the drive, but broken from the bottom. To carry forward the air on level face a stope is being taken out, and an air-course carried along to connect with the winze. The air was dull on the level face, but a holing was expected that night. Stopping between Nos. 8 and 9 was nearly finished. On the intermediate, between Nos. 6 and 7, a cross-reef was followed for 40 ft., but was cut off by a new make of stone. Green and party are following the leaders that were left from the former workings; ventilation good. Garbett and party (two men) are cross-cutting for a reef that is supposed to exist in the ground where they are working.

*United Italy.*—(21/1/98): This property is situated nine miles north of Lyell. There are two men driving on track of a reef 18 in. wide. The present face of the drive is very wet, which retards the progress of the work very much. Small veins of quartz are making in the track, and the men are hopeful of good stone.

*Golden Crown.*—(21/1/98): This company holds an area of 50 acres. The work is chiefly prospecting, and is under the charge of James Greaves. Several gold-bearing veins, varying from 6 in. to 2 ft., have been cut. A reef from 1½ ft. to 11 ft. in width traverses the ground, and tests made of this stone give promising results.

*Crasus, Lyell.*—(21/1/98): Satisfactory progress is being made with repairs to the fluming and battery. A parcel of stone belonging to the Tyr Connel Company will be the first to be crushed. Work at Tyr Connel has ceased.

#### WESTPORT.

*Lady Agnes Quartz-mine.*—(28/3/98): Work is chiefly prospecting, four men driving and one man working on the surface. A tunnel is driven 250 ft. following the line of reef.

*Red Queen.*—(28/3/98): At time of visit there were no men at work.

*Swanson Claim.*—(28/3/98): No work being done here.

*Britannia Quartz-mine.*—(29/3/98): This lease is held by a local company. The country is of a broken formation, and nothing defined has yet been met. Two veins are known to exist in the ground about a quarter of a mile apart, and prospecting has been carried on. From the Fortune Creek side of the hill three levels have been driven on No. 1 reef, and three on No. 2 reef from Gardener Creek side. The quartz, which is found in crushed patches, contains gold. Since the occupation of this company £1,400 has been expended on the property, and over 1,000 ft. of tunnels driven. Five men employed.

*Republic.*—(29/3/98): At time of visit no men at work. The battery and aerial tramway have been put in good repair.

*Cosmopolitan Syndicate.*—(29/3/98): One man prospecting on the surface.

*Twins, late Beaconsfield.*—(30/3/98): Two men repairing the drive on the south side of stream, eight men excavating battery-site, and three men repairing water-race.

#### REEFTON.

*Inangahua Low Level.*—(17/3/98): Since the present company took possession of this property the main tunnel has been driven 2,376 ft., making a total distance of 6,276 ft.; from mouth of tunnel to air-winch, 3,900 ft.; from mouth of tunnel to cross-cut, 4,686 ft.; length of cross-cut, 410 ft. At the latter measurement the rise is put up to meet the winze sunk from the Ajax section. Depth of winze, 475 ft. The distance to be risen will be about 100 ft.

*Progress Extended Quartz-mine.*—(10/2/98): The principal work in connection with mining operations on this property has been the sinking of the Globe shaft. Sinking operations were commenced on the 9th November, 1896, and completed on the 21st August, 1897. During that time a delay of three weeks was caused by a surface landslip. Two winding compartments and ladder-way, 4 ft. by 4½ ft., and 2 ft. by 4½ ft. respectively, are well timbered throughout, and all the details of the work have been satisfactorily carried out. Large and securely timbered chambers forming the entrances to the levels have been constructed. The development-works, which have attained an advanced stage, place this property in a position to produce large outputs of ore from the bodies of stone that are in sight. With the facilities which the two main shafts afford a steady ventilating current is supplied. Timber, where required, is heavy and well set. To connect the rise from No. 6 with bottom of winze from No. 5 a distance of 15 ft. has yet to be risen. This connection will improve the ventilation on both levels, and carry the air forward on No. 5 stopes. The western extension of No. 7 level from the Globe shaft, which runs parallel with Progress low level, is connected by short rises, thus carrying the air forward on the working-face.

*Wealth of Nations.*—(22/12/97): The incline shaft, 6 ft. in length by 3 ft. 6 in. wide, which has been sunk (on an underlie of 2½ in. to 1 ft.) from the battery-level to a depth of 630 ft., it is securely lined, and all the necessary fittings for winding purposes are complete. The shaft has one winding compartment, 3 ft. 6 in. square, and ladder-way, 2 ft. 6 in. by 3 ft. 6 in. The winding-engines are placed in position; head-gear and delivery-bins have been erected. A line of 3 in. steel pipes 1,700 ft. in length connect the air-compressors with the winding-engines. The 350 ft. and 500 ft. levels have been extended 320 ft. and 40 ft. respectively, both on track of reef. The Energetic, battery, and 200 ft. levels are being retimbered. All other work done is of a development character. Air good throughout the mine, and reports kept. Sixteen men employed.

*Keep-It-Dark Quartz-mine.*—(27/10/97): The south drive has been driven 55 ft. on track of reef with no indications of change. On No. 5 level eight men are stoping. Ventilation good, rules posted, and reports kept. The clearing out and retimbering of the upcast shaft from No. 2 to battery level has been done satisfactorily, and ladders are provided the whole distance. The cross-cut from No. 1 level struck the line of reef at 190 ft., and at 150 ft. a short drive was set off on the track. After driving 72 ft. a fine block of stone was met, and when last visited 35 ft. was driven in the stone, which measured 13 ft. on the face. A further make of stone was shown on the hanging-wall. Air-boxes are led forward to the face. Sixteen men employed. The ventilation of this new section of work will be very much facilitated by the work done on the upcast shaft.

*Hercules Quartz-mines.*—(29/9/97): There are only four contractors driving the south-west cross-cut at the 470 ft. level. (23/12/97): Four men are extending north level on reef track. Since starting, 85 ft. has been driven. Ventilation good, reports daily kept, and rules posted.

*No. 2 South Keep-It-Dark Mine.*—(27/10/97): Four contractors are driving the south-west cross-cut on No. 3 level, the distance driven being 260 ft. from the shaft. Ventilation good. (23/12/97): This cross-cut has been extended for 30 ft., and the contract has now expired. Reports kept. Six men employed.

*Ajax Quartz-mine.*—(17/3/98): The winze has been sunk to a depth of 475 ft. A rise from the Inangahua low level will connect with this winze, the height to be risen about 100 ft. There are three men prospecting some of the upper levels and keeping the water from the winze.

*Sir Francis Drake Quartz-mine.*—(26/8/97): During the year the principal work has been stoping out a block of ground in the surface-level, which is now exhausted. On a later visit work is again resumed in the shaft preparatory to sinking. Eight men are employed.

*Big River Quartz-mine.*—The No. 6 level, 930 ft. below the surface, has been driven 270 ft. to intersect the line of reefing country. A rise was put up 60 ft. to connect with the winze, which was sunk 90 ft. on the stone from No. 5. At the bottom of this winze 150 ft. was driven along the track, which contained lumps of gold-bearing quartz. In the low level several hundred feet of driving has been carried out, but without favourable results. A tunnel has been started from the shaft to intersect and prospect the old blocks, which were worked with success on the higher levels. After driving 100 ft. on the intermediate, between Nos. 1 and 2 levels, a small block of rich stone was found, but it soon ran out again. This level is being continued on a good track, and payable stone is expected.

*Inkerman Combined Quartz-mines.*—(11/2/98): Since February, 1897, the reopening and prospecting of these old properties have been vigorously pushed forward under the supervision of Mr. G. G. Dixon. At the New Inkerman Mines 504 ft. of country has been opened, representing 383 ft. of driving, and sinking and rising 121 ft. The work carried out in the old Inkerman consists of 818 ft. driving and 212 ft. sinking. To ventilate this section a shaft was sunk 102 ft. and connected with an old uprise. At the Supreme Mine 970 ft. of country has been opened, 514 ft. of this distance in ore. The low-level tunnel from Rainy Creek was commenced in February, 1897, and on the 25th March 2,089 ft. was driven, 221 ft. by hand-drills and 1,868 ft. by rock-drills—respective weekly averages, 18.41 ft. and 40.6 ft. The greatest distance driven in any one week was 64 ft., and in any four consecutive weeks 199.5 ft. Air-boxes are led throughout the tunnel, and are worked by an exhaust obtained from the compressed-air receiver at the mouth of the tunnel. The total new country opened represents 6,157 ft., and the average number of men employed was sixty-five. The wages paid to the workmen for the fifteen months amount to £11,324, exclusive of those getting timber and driving by contract, and official salaries.

#### VICTORIA RANGE.

*Lord Brassey Mine.*—(20/2/98): The very important discovery of fragments of quartz containing gold, made eighteen months since, has been the cause of a good deal of driving and prospecting. No. 1 level is being driven from east to west. The course of the loose stone is north and south, and will give 200 ft. of backs in this tunnel, which is 173 ft. in length. No. 2 cross-cut is about 4 chains further down the range, and is being driven in the same direction as No. 1. The length driven is 130 ft. Two shafts have been sunk—one 20 ft., the other 26 ft., in depth—carrying payable stone. Fifteen men employed.

*New Haven Special Claim.*—(22/2/98): This property is situated to the north of the Lord Brassey Special Claim. They have sunk 30 ft. on a vertical leader, and it shows gold to that depth. Here it opens out to a fine body of stone 5 ft. wide, and gold can be got by pounding and panning. Two men employed.

#### PAPAROA RANGES.

*Julian Claim.*—(4/9/97): Two men employed. They have about 40 tons of stone in the paddock. (14/12/97): Two men driving a low level.

*Victory Mine.*—(4/9/97): Six men employed; ventilation good. The quartz in this mine is of good quality (see returns). (14/12/97): Seven men employed, four stoping and three attending to the battery and other outside work. Good ventilation.

*Minerva Special Claim.*—(13/3/98): No one at work at the time of my visit.

*Taffie Special Claim.*—(14/3/98): This property is situated on the western slopes of the range. There are various reefs and leaders in the ground carrying gold. In one reef 3 ft. wide, coarse gold can be seen in the stone. Three men employed.

*Cresus Special Claim.*—(15/3/98): Fifteen men employed. A winze on a reef 4 ft. in width has been sunk 40 ft., and the manager informed me good payable stone was found the whole of the way down. The water was very troublesome, and had to be drained by a cross-cut, which will give 150 ft. of backs (vertical). Where the reef was cut at the flat sheet it is 2 ft. 6 in. wide. When driven on this reef varies in size up to 5 ft. wide, and as gold is seen in the quartz stored at mouth of drive it should be payable. There is about 60 tons stored at the mouth of this cross-cut. No. 1 South cross-cut is driven 68 ft. to intersect No. 1 reef, which averages 2 ft., wide and prospects well at the outcrop wherever cut into. This cross-cut will give 160 ft. of backs (vertical).

*Poneke Special Claim.*—This company is driving a cross-cut, present length 250 ft.

*Homeward Bound Special Claim.*—This company is at present driving a cross-cut. At 60 ft. a small leader carrying gold was cut.

*Red Lion Special Claim.*—Two men prospecting on the surface.

*Alpha Special Claim.*—Three men prospecting on the surface.

*Zealandia Special Claim.*—(15/3/98): One man prospecting on the surface.

*Triple Alliance Special Claim.*—One man prospecting on the surface.

*Imperial Special Claim.*—Two men prospecting on the surface.

#### Ross.

(23/4/98): Antonio Zala's tunnel is very wet, and occasionally small patches of quartz are met with. This tunnel is a subsidised one.

Gagliardi and Son's tunnel is also a subsidised one, and is very wet. The country rock now being penetrated is very favourable for gold, and the reef should soon be met with.

*Alpha.*—No driving has been done in this mine for some time. The two men employed having been engaged in making a tramway and repairing the small battery.

## BOATMAN'S GROUP, LARRY'S CREEK.

*Caledonia and Rosebery Special Claims* (100 acres each).—The only work now being done is cleaning out and repairing the previous workings and putting up a rise on the boundary of a known block of stone. This rise will be suitable both for stoping and ventilation. Nine men employed.

*Welcome*.—(17/3/98): Operations are of the same character as mentioned in last annual report. The works are purely of a development character—viz., extending No. 4 tunnel on the line of Welcome lode, which averages 2 ft. 6 in. in width.

The Fiery Cross battery and water-race have been put in repair preparatory to crushing 150 tons of ore now at grass, so as to test its value prior to more extensive developments. Fifteen men employed. Ventilation good.

*Dillon Extended* (Area, 60 acres).—(19/2/98): The reef averages from 18 in. to 5 ft. in width. There is about 60 tons of quartz in the hoppers and battery. The aerial tramway has just been put in thorough repair. Five men employed.

## ALLUVIAL MINING.

## MAHAKIPAWA.

*King Solomon Mine*.—(17/11/97): The pumping- and winding-shaft, which is 120 ft. deep, is securely lined with sawn timber, and is fitted with a proper staged ladder. The motive-power supplied for pumping and winding is communicated from a 30 ft. diameter overshot water-wheel, from which a 10 in. diameter lifting-set with 3 ft. stroke, connected to a quadrant, raises the water direct to the surface. A level from the bottom of winding-shaft, following the run of the wash-drift in a south-easterly direction, is driven 300 ft. Air-boxes were led up to the face, and the drive is well timbered. Notice was given for further fencing round the shaft, also to provide a proper magazine for explosives. These instructions were carried out. Five men employed.

## WAKAMARINA.

*Wakamarina Gorge Claim*.—(18/11/97): The work of clearing out the *débris* from the bottom of this gorge is carried on successfully under the management of Mr. Thomas Alexander. The Skeleton shaft, formerly used for raising the dirt from the lower end of the claim, is abandoned. Operations are now carried on from the upper end of the gorge, where the dirt is filled into trucks and hauled up an incline tramway on to the top of the dam; the dirt is tipped from the trucks into a sluice-box, and afterwards discharged into the river. The water is raised to the surface by two sets of lifting-pumps, 75 ft. in depth, with 3 ft. to 5 ft. stroke, both sets working from quadrants, which are connected direct to the engine. The dams, as far as can be seen, are thoroughly reliable, but Mr. Alexander has added some improvements to the upper dam. Fourteen men employed. In fine weather the water is pumped in a shift of eight hours.

## COLLINGWOOD.

*Quartz Ranges Crushing and Sluicing Company*.—(29/10/97): This company, whose head office is in London, has a capital of £35,000, and holds an area of 300 acres, about twenty-two miles west of Collingwood—seventeen miles and a half by main road, the remainder of the road by tramway, in the construction of which there are eighteen men employed. The water for sluicing will be taken from the Boulder River and Lake, and conveyed by flume for a distance of four miles and a half, the quantity of timber required for the fluming being 700,000 ft. In addition, 2,200 ft. of pipes, 2 ft. 4 in. in diameter, will be required. The altitude of the point of the river where the water is to be obtained is 1,600 ft., and the altitude of the sluicing-face 1,200 ft. The company has a large number of men employed, and are erecting a sawmill to cut the timber required for mining operations, houses, offices, &c. The works are under the management of Mr. F. G. Mace.

*Rocky River Sluicing Company*.—(28/10/97): This company, whose head office is in Auckland, holds an area of 100 acres, nineteen miles south of Collingwood, the workings being at an altitude of 1,200 ft. Water for sluicing is at present obtained from McKenzie Creek, but a survey has been made for a larger race, to be taken from the Rocky River. The pipes for this work are being made in Nelson. A large quantity of gold has been obtained in this district from time to time. Six private parties now at work are making good wages. The gold is coarse, and a piece weighing 16 dwt., with small particles of quartz attached to it, was recently picked up. On the top of the range (locally known as "The Castles") there is a large quantity of gold-bearing cement with a thick layer of limestone underneath.

*Parapara Hydraulic Sluicing Company*.—(27/10/97): Operations at this claim are carried on with ten men, working two nozzles, 4 in. and 3½ in. respectively. There are two faces operated on. No. 1 face is worked 47 ft. in height, and No. 2 is taken in benches 26 ft. and 40 ft., twenty heads of water being in constant use. The dimensions of the main tail-race are 4 ft. wide by 3 ft. deep, and connected with a branch 2½ ft. wide by 3 ft. deep. The wash-dirt overlies a body of limestone, which rises in ridges, making the progress of the work very expensive. A miner named Thomas R. Dillon, while engaged at the nozzle, was caught by a slip of earth from the face, dislocating and breaking the small bone of his ankle.

## WESTPORT.

*Halligan and Party's Claim, Addison's Flat*.—(16/2/98): This property is worked by a party of six men. A new face is being opened out on the upper side of the Charleston Road, from which a shaft is sunk connecting the main tail-race. The plant in connection with the elevating tramway and water-balance appliances is completed and in working-order. At present the men are engaged excavating a table-site on the line of tail-race 2,370 ft. from the working-face.

*Shamrock Claim*.—(16/2/98): The various works in connection with this property are undergoing a thorough overhaul and renewal. A further extension of the sand channel has been driven 400 ft., with the object of opening out the ground at the present face. The elevating tramway and

hydraulic machinery connected therewith are rebuilt and placed in suitable position. Considerable improvements to the gold-saving have been added, and an additional six heads of water have been obtained after repairs were carried out on the race. Eight men are employed.

*General Exploration Company.*—(16/2/98): The works in connection with these properties are being carried steadily forward under the supervision of Mr. Bradden, acting attorney for this company, who furnishes the following statement:—

During the twelve months ending the 31st March, 1898, the General Exploration Company has engaged in the development of two principal hydraulic schemes in the Westport district—viz., the Fairdown Terrace, on the north of the Buller River, and the Bendigo Terrace, on the south side. In addition, the working of high-level cement areas at the Four-mile has been undertaken; also general prospecting has been and is being consistently prosecuted. The Fairdown has been developed to a productive point, and has been in work for some time. It is contemplated and intended to still further enlarge the water-supply for these operations by an expenditure of £4,000 to £5,000 in lifting the Wareatea water-supply.

The Bendigo Terrace operations are approaching partial completion. A beginning at sluicing should become possible, by completion of tail-tunnel, elevating-shaft and gear, and opening out work, towards end of June next. The water-supply for Bendigo so far as at present completed is provided principally by Island Creek, Reid's Creek, Back Creek, and Waimea Creek. The extended proposition of water-supply for Bendigo and Addison's Flat, for which surveys have been completed and which will likely be put in hand before long, embraces the Nine-mile, Twelve-mile, and Thirteen-mile Creeks. Finally, there is the Ohika River supply, which may be brought in should there be found warranty in the extent and value of available alluvial gold areas for the expenditure of £50,000 to £80,000 which such an induction would involve.

The construction-works carried out in developing so far the two properties mentioned consists of—25,014 ft. of water-races; 10,857 ft. of tunnel; 14,000 cubic yards of dam embankment; 230,000 superficial feet of timber; 3,120 lineal feet of iron pipes, 18 in. and 24 in.; 8,200 square feet of gold-saving-table surface; 5,180 ft. of shafts, containing about 1,300 superficial feet of timber. The average number of men employed during the course of the company's operations has been 218. Expenditure for wages, £23,000; expenditure for material, £8,500. To complete the construction-works on hand will require 200,000 superficial feet of timber, 3,000 ft. tunnelling, 10,000 ft. ditch construction and enlargement.

The present operations of the General Exploration Company by their comprehensiveness and scale, using forty-five to fifty heads of water, will have the effect of making remunerative the workings of alluvial materials left as too risky to touch with the smaller supplies heretofore generally in use. If this expansion of scale on which operations are to be conducted has the desired effect in diminution of working-costs, then the further enlargements of sluicing schemes up to a hundred heads or more by the introduction of such a supply as that of the "Ohika" would, despite its great cost, be a reasonable proposition in view of the existence at command of the enormous areas of 1½ gr. to 2 gr. ground then becoming workable.

#### REEFTON.

*A1 Sluicing Claim.*—(16/3/98): This subsidised prospecting-tunnel has been extended a further distance of 728 ft., which makes a total distance of 1,317 ft. The object of this drive is to open out an alluvial flat that lies between Cronadun and Boatman's. Small prospects of gold can be obtained all along the drift. Air-shafts are sunk at regular intervals, producing good ventilation.

#### GREY DISTRICT.

*Barrytown No. 1.*—(11/3/98): Nearly all the machinery and 170,000 ft. of timber for the water-races and other works are successfully landed, and operations in erection of works and completion of water-races are being pushed ahead before winter sets in. A mile and a quarter of benching has been finished, and on the completion of the water-race there will be 600 ft. of pressure on the nozzles. Area, 192 acres. Twenty men employed.

*Barrytown No. 2 Special Claim.*—This company has let a contract of a mile of water-race, 4 ft. by 4 ft. The contractor is pushing on the work as fast as he can get the material.

*Waiwera Special Claim.*—This company is also pushing on the water-races as fast as possible, employing fifty men. A few days prior to my visit a large landslip occurred and did considerable damage to the portion already constructed.

On the beaches between Greymouth and Barrytown there is a considerable number of men washing the beach sand.

#### HEALEY'S GULLY, BLACKBALL DISTRICT.

(14/3/98): The Healey Gully Company is now supplying twenty-two men with water in their various claims, and is utilising the surplus on its own property. Two of the small claims using water have had a splendid wash-up for their first month's operations. The water having been brought on to this field, the various miners I spoke to were very hopeful of a successful future.

*Montgomery's Terrace* (Area, 100 acres).—This property has been prospected by two tunnels driven into the terrace so as to prove its value. The owners being now satisfied, there is £10,000 available to bring in the Blackball Creek and open up the mine. Mr. T. Jones informed me that active operations will be commenced at an early date.

#### AHAURA DISTRICT.

(8/10/97): There are twenty-one Europeans and one Chinaman working in Callaghan's Creek; twenty-seven Europeans in Nelson Creek and its tributaries. The miners here are very reticent about what gold they are getting—in fact, they refuse to give any information.

In German Gully, near Callaghan's Creek, a Christchurch company is carrying out some very large development-works prior to starting hydraulic sluicing.

## ORWELL CREEK.

(16/3/98): About thirty men are working the terraces, but operations are restricted owing to the want of a good water-supply.

## PENNYWEIGHT FLAT.

The population is about forty men and all are getting a little gold.

## GREY VALLEY.

*Sulky Gully Water-race*.—(15/12/97): A further subsidy of £68 has been granted to carry out the work of construction. 185 chains of open channel between the rock tunnel and head-race has been completed.

## HOKITIKA.

*Craig's Freehold*.—(12/3/98): This property is worked by seven tributers and one wages-man. A rich lead running north and south from the end of cross-cut 2,500 ft. in showed gold freely, which is deposited in a brown cement, averaging from 12 in. to 18 in. At 400 ft. in, a south drive 300 ft. struck good wash. Ventilation is supplied from an air-shaft at the junction of the cross-cut.

*Humphrey's Gully*.—(14/2/98): This property has an area of 300 acres, which is held by the Consolidated Goldfields of New Zealand. Operations on the claims employ two nozzles, with a capacity of over twenty heads. The survey for the extended water-scheme has been completed from the Arahura River to Brown's Creek. Five men are employed on the claim.

*Arahura Flat*.—(10/2/98): This subsidised tunnel has been driven 1,627 ft. by Dwyer and party. A ventilating shaft was required at the face, which was promised to be done.

## GREENSTONE DISTRICT.

(28/1/98): There are about a hundred and thirty miners working with varied success.

## KUMARA.

(30/1/98): No. 5 tail-race has not yet been completed. The present face shows about 1 ft. of blue reef in the bottom, the remainder loose gravels with a large body of water overhead.

At the time of my visit the deep-level tunnel was at a standstill. Work was to start in a few days, the Government having authorised an extension of 200 ft., not to cost more than 15s. per foot, the department to pay two-thirds.

## KELLY'S TERRACE.

(29/1/98): At the time of my visit this drainage tunnel was idle. This work has been subsidised by the Government. Total length driven, 2,650 ft., leaving 3,950 ft. more to be driven to the point where payable gold was left many years ago.

## WAIMEA.

(6/10/97): Work in the Waimea Main Tail-race at the time of my visit was suspended pending some arrangements with the trustees.

At Taipo Water-race, on the 14th September, 1897, Richard Bennett, aged twenty-seven years, was injured by a stone rolling down the hill and striking him on the head. (19/10/97): Dr. Scott reports Bennett progressing very favourably.

## ROSS.

*Mont d'Or Claim*.—During the year sluicing operations have been carried on satisfactorily. Twenty-two men employed.

*Ross United*.—This property is being worked by twelve tributers.

*Prince of Wales*.—This property is now being worked by eight tributers.

In Donnelly's Creek there are several parties working with varied results.

*Totara Dredging Syndicate* (area 40 acres).—(28/2/98): Eight men employed sinking a shaft so as to test the depth of the wash preparatory to building a dredge. At the time of my visit they were down 15 ft.

## FROM ROSS TO OKARITO AND WAIHO.

*Duffer's Creek, Eighteen Miles South of Ross.*

(3/3/98): There is a tunnel being driven here subsidised by the Department. The present length is 373 ft. Marches and Scott are putting in this drive at present. There are six men working here as hatters.

*Lake Ianthe.*

There are six men here hydraulic sluicing, paying a royalty to Mr. Green for the use of the water from his race.

*Waiho River.*

The Wild Gold-mining Company had two special claims at the time of my visit. Nearly all of the benching for the pipe-lines was completed. Two tunnels have to be driven. No. 1, total length 135 ft., of which 100 ft. has been done; No. 2, 250 ft., 25 ft. of this has been driven. The rock these tunnels are passing through is of a very firm description of serpentine. This company is employing sixteen miners and nine surfacemen.

On the various branches above Nesbits there are sixteen miners working with varied results.

*Lake Mapourika and Forks.*

There are twenty-three miners working, either single-handed or in pairs. There are also seven men working just below the Forks.

## CEMENT-MINING.

## ADDISON'S FLAT.

*Golden Sand.*—(30/3/97) : This property is largely owned by an Auckland syndicate, who have erected a ten-head battery. The stamps and all the machinery, which appear to be substantially built, were manufactured at the Despatch Foundry, Greymouth, had a very successful start. The cement is brought up to the mill on an incline tramway, the motive-power being supplied by a 12 ft. water-wheel, and for the battery by a 6 ft. Pelton. The cement to be operated on is of large extent, the area being about 300 acres, and in the present face 8 ft. thick. Twelve men are employed.

*Venture Claim.*—(30/3/98) : This property is largely owned by a local syndicate, who employ eight men. The battery, which consists of twelve stamps, 4 cwt. each, has been at work for some years, a water-wheel, 30 ft. diameter and 2½ ft. breast, supplying the motive-power. The cement lead is 4 ft. thick, and is connected with the battery by a horse-tramway.

*Milligan and Party.*—(30/3/98) : This party hold an area of 50 acres, employing eleven men. The cement lead, which is from 7 ft. to 14 ft. in thickness, is connected with the battery by a horse-tramway. There are ten heads of stampers, 6 cwt. each, driven by a 6 ft. Pelton.

## CHARLESTON.

*Dublin City Cement Claim* (9 acres).—(19/10/97) : The cement is 7 ft. to 9 ft. thick, and is conveyed to the battery by a ground-tramway 3 chains long. The battery consists of eight stampers—weight, 350 lb.; motive-power, water-wheel 30 ft. in diameter, 3 ft. breast; crushing 16 yards per day of nine hours. Average value of gold, £3 19s. per ounce. At the time of last visit they had recoppered the tables, as the previous ones had been stolen. This claim is being worked by the four shareholders.

*Morning Star Cement Claim.*—This claim is owned and worked by four shareholders. The cement-bed is 5 ft. thick, and is connected with the battery by a chute 40 ft. long, and a wooden tramway 3 chains long. The battery consists of four head, weight 400 lb.; motive-power, water-wheel 35 ft. in diameter, 2 ft. 6 in. breast. About sixteen loads of cement is crushed every day of nine hours. Average yield, 2 dwt. per load; value, £3 19s. per oz.

*Enterprise Cement Claim.*—This claim is owned and worked by four shareholders, who are working it over for the third time—viz., first, they sluiced away about 4 ft.; second, they sluiced away about 1 ft.; third, they are taking everything except granite boulders. This averages from 4 ft. to 5 ft. in thickness, and is worth about 2s. 6d. per ton. This cement-bed is connected by a wooden tramway 7 chains long to the battery (four heads, weight 500 lb.); motive-power, water-wheel 30 ft. in diameter, 2 ft. 6 in. breast.

(19/10/97) : Owing to heavy rains Birch and party's cement claim was not visited. Their returns show : Crushed, 2,600 tons; yield, 51 oz. melted gold.

## RETURNS from CEMENT-MINES, 1897 and 1898.

Name of Mine.	Ordinary Cement crushed.		Retorted Gold.	Approximate Value.		
	Tons.			Oz.	dwt.	gr.
Charleston and Brighton	4,700			62	0	0
Dublin City	...			48	0	0
T. M. Norris and Tyther	...			11	6	12
Patrick Dyer and party	3,300			246	1	0
Golden Sand	3,234			94	16	18
Tyther and party	931			29	9	0
William Millikin and party	9,792			406	0	0
Totals	21,957			897	13	6
				3,526	19	6

## DREDGING.

*Philips Dredging Company, Mahinapua Creek.*—(29/1/98) : The dredge was floated on to this creek in November, 1897. Since that time work has been of a preparatory and prospecting character. The ground where operations are commenced is on a swampy flat, which forms a large bend of the creek, about one mile from the lake. The pontoons, which are built of steel plates ¾ in. on the bottom, are 90 ft. long by 20 ft. wide and 3 ft. 9 in. deep. The ladder is 72 ft. 6 in. long from centre to centre of tumbler shaft, and carries forty-three buckets, each having a capacity of 2½ cubic feet. The buckets deliver the *débris* into iron-grated sluice-boxes, through which the wash falls into a distributing-box; from thence it is run over a 30 ft. spread of plush-tables. The engines are of the compound type, with horizontal cylinders, 7 in. and 13½ in. diameters, with 12 in. stroke, and 7 in. and 12½ in. with 16 in. stroke. Water for washing purposes is supplied by a 13½ in. centrifugal pump, and the engines are worked at a pressure of 90 lb. from a Cornish boiler, 5 ft. diameter by 15 ft. in length, consuming 15 cwt. of Brunner coal in eight hours. The plant is placed between decks, occupying the stern-end behind the ladder. A good boat is provided, but no life-belts were on board; these have since been provided. Five men are employed on two shifts.

## ACCIDENTS.

Ahaura, 25th June, 1897.—George Barnes was caught by a fall of wash-dirt while working by himself. He was taken out alive after being held by the legs for thirty-six hours, but died shortly after being released.



Ross, 27th July, 1897.—Thomas McGlarry was killed by a fall of wash-dirt. No blame was attached to any person.

Taipo, 14th September, 1897.—Richard Bennett received a fracture of the skull, caused by a stone rolling from the hillside.

Dee Creek Sluicing Company's Works, 9th October, 1897.—James Kirkness, aged twenty-eight years, had his right hand blown off while thawing a plug of dynamite; and David Swanson received injuries to his eyes.

Fairdown Sluicing Claim, 16th October, 1897.—George Ross, aged thirty-five years, had his left leg broken whilst attempting to lift a stone out of the sluice-box.

Reefton, 22nd October, 1897.—Philip Murphy was killed by a large granite boulder falling on his head whilst cleaning up some wash-dirt.

Wealth of Nations Mine, 12th December, 1897.—John Dixon, aged twenty-five years, was injured by the sudden fall of a platform down the shaft a distance of 150 ft.

Red Jack's Terrace, near Brighton, 8th March, 1898.—Samuel McFetish was killed by a fall of wash-dirt whilst holing at the face.

#### GENERAL.

At Karamea some large areas were pegged off, and several water-races also applied for. There are six men prospecting Scarlot's property prior to putting it on the Home market. So far the developments are said to be of a most satisfactory character.

At Charleston the whole of the back lead of cement has been applied for, and prospecting-shafts are being sunk prior to bringing in water and erecting reducing machinery.

Mining at Ahaura has received an impetus lately owing to a discovery of gold in the terraces on the Seven-mile Creek.

Wakamarina District: This almost exhausted goldfield still supports about thirty men, some of whom make fair wages.

I have, &c.,

R. TENNENT,

Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

#### No. 17.

Mr. JOHN HAYES, Acting Inspector of Mines, to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Inspector of Mines' Office, Dunedin, 14th April, 1898.

I have the honour to report on the following gold-mining properties visited by me:—

#### QUARTZ-MINES.

*Gabriel's Gully, Lawrence.*—(6/5/97): An attempt is now being made to resume quartz-mining work here. Some years ago a reef varying from 2 ft. to 9 ft. wide was worked by a high-level adit between the main Blue Spur fault and a cross-course. A tunnel at a low level was also driven, and proved the reef to be only a few inches wide. From this tunnel exploration-works were conducted with the object of picking up the reef beyond the cross-course, but were not successful. The Gabriel's Gully Prospecting Association has had this low-level tunnel cleaned out and retimbered where necessary, with the object of again looking for the reef. The work has been very satisfactorily performed, so far as it has gone, and it is now intended to drive in the solid ground. (7/3/98): Three men are now employed here. At the present time they are working in the old high-level tunnel driving alongside the cross-course. Some stone of from 3 ft. to 4 ft. wide has been got, but it is possible it may turn out to be quartz which was left when the place was formerly worked.

*Phoenix Mine, Bullendale (Achilles Goldfields, Limited).*—(12/10/97): For some time past operations have been in progress with a view to increasing the efficiency of the mine and the reduction of working-expenses. Among the work in hand may be mentioned the sinking of a new incline shaft to the lowest levels, the grade being 54° from the horizontal, except for a short length near the bottom, where it is 60°. Double lines of rails are laid, and a well-built stairway (in lieu of ladders) is provided and substantially fenced from the winding-side of the shaft. The winding-power will be water at a high pressure working a Pelton wheel, connected by gearing to the winding-drums. It is intended to hoist all the quartz up this shaft and dispense with the present winding arrangements at the vertical shaft and the winzes connecting it with the lower levels. Underground, I found the workings in good order and admirably ventilated. The principal working-places are in Nos. 4 and 5 levels, and work (chiefly of a prospecting character) is going on in No. 6 level. At the mine, battery, and other works in connection with the mine (including new developments) 101 persons are engaged, but about forty-five of these will be dispensed with when the new plant is completed and at work. (23/2/98): Since my visit in October last considerable progress has been made in the erection of hauling and pumping plant at the new incline shaft. The latter is now sunk to within a short distance of No. 5 level, and if no interruption occurs the new arrangements should be in full work in the course of a few weeks. A winze is being sunk on the reef below No. 5 level. Ventilation and timbering satisfactory, but I had to find fault with the careless manner in which some of the men handle their explosives, and wrote the management thereon on my return to Dunedin.

The Phoenix is the only quartz-mine at present working in the locality.

*Premier Mine, Macetown (Glenrock Consolidated Company, Limited).*—(18/10/97): This mine is entered by an adit-level about 1,500 ft. long. The reef is followed on a grade of about 1 in 4 by an incline, the trucks being hauled up the incline by winding-gear worked by an electric motor. The walls of the reef appear to have a varying angle, averaging probably 50° from the horizontal, the reef having a variable width up to 6 ft. The method of working is by overhand stopes. The stone appears very good, and the prospects look favourable. Roadways and working-places are well timbered and looked after. Ventilation satisfactory. More man-holes are needed on the



incline: this was promised to be attended to. The battery has twenty heads of stamps, driven by a 6 ft. Pelton wheel. This wheel also drives the dynamo which generates current for the electric motor underground. A 4-ton cyanide plant is attached to the battery. Employés, forty-one. (24/2/98): Since my last visit the incline man-holes have been cut, and my instructions generally attended to. The question of the storage of explosives is one which affects this company's mine, and also the adjoining Tipperary Mine, belonging to the Westralia and New Zealand Gold-explorers (Limited), and has been made the subject of a communication to the Mines Department, Wellington. The reef continues variable in width, the foot-wall being irregular. Timbering and ventilation very satisfactory. There is a second outlet to the mine, so that in the event of any breakdown in the main tunnel the men have good means of egress. Total number of employés at mine and battery, fifty-five.

*Tipperary Mine, Macetown (Westralia and New Zealand Gold-explorers, Limited).—(18/10/97):* The adit-tunnel into this mine is 1,960 ft. long, and the drive extends 300 ft. on the line of reef from end of adit-tunnel. The reef has a varying width of from 5 ft. to 6 in., and is smallest at the face of drive. Near this point a winze-shaft is being sunk to prove the reef at a lower level. There is very little milling-stone in sight at present. Timbering appears to have careful attention, and the air is sweet. There being only one means of ingress to and egress from the workings, the ventilation is produced by a water-blast and the air conveyed in sheet-iron pipes. The battery is not at present at work. Persons employed, 15. (25/2/98): The winze-shaft, which had been commenced shortly before my last visit, is now down 80 ft., and shows the reef to be 4 ft. 8 in. wide. After another 20 ft. has been sunk it is intended to open out. The main drive has been continued, and shows better stone than when I previously saw it. To the rise of the main level the stone does not look very satisfactory, and prospecting operations are being prosecuted in the old low-level tunnel of the former proprietary—but which is considerably higher than the present company's level—to ascertain what stone exists to the rise of the present company's workings. The timbering and general arrangements of the mine are well carried out, but at this date the air was very slack at the working-face. Mr. Stanford, the manager, states that in a short time a connection will be made with the prospecting-tunnel, which will give a second outlet and insure better ventilation. Persons employed, nineteen.

While at Macetown I learned that two men were engaged in prospecting at the Victor Emmanuel property, and that preparations were being made to open out the Sunrise Mine on Advance Peak by the Glenrock Consolidated Company (Limited).

*Bendigo Mine, near Cromwell (Cromwell Goldfields Company, Limited).—(17/1/98):* This mine is now being worked on tribute, the party of tributers, ten in number, being engaged in extracting a block of stone at the 200 ft. level in the old main shaft. The ventilation and general arrangements for safety appeared to be well attended to, but more care should be exercised by the men in handling explosives. The principal shaft (which at present is used for pumping only) is some 14 chains east of the old main shaft, and connects with the reef by a cross-cut driven to the south. Here the reef is from 1 ft. to 2 ft. wide. I was informed that in the worked-out ground the reef had attained a maximum width of 10 ft. It splits up, or divides, between the two shafts, and the tributers are working on the north division of the reef, from which excellent returns have been obtained, 2½ oz. of gold per ton of stone crushed being a fair average; value of gold, £3 15s. per ounce. It is maintained that these returns would have been better still if more modern methods of treating the tailings were provided, and it is safe to say that the stone from the deeper ground has a much greater assay-value than can ever be realised with the present appliances. A second party of tributers are about to commence work at the principal shaft. At this shaft there is a lot of plant of a somewhat obsolete character, and if deeper sinking should be undertaken a new installation will in all probability be required. Superficially, it looks as if an adit from the valley below the mine would strike the reef at as low a level as the bottom of the present principal shaft. Assuming such an adit being driven, it would obviate some 500 ft. of winding and pumping, the shaft could be sunk as low as necessary, and all stone and water delivered at the adit. The water-power now driving the pumps and battery could be carried to the lower level, and would gain an additional pressure of some 200 lb. per square inch.

*Golden Gate Quartz-mining Company, Bannockburn (James Horn, Secretary).—(18/1/98):* Work has been going on at this company's mine in a small way for a couple of years, two men being ordinarily employed. Latterly six men were engaged, and some stone has been taken out, a trial crushing giving a return of 12½ dwt. to the ton. The reef is lying at an angle of, say, 15 deg. from the horizontal (more like a coal-seam), with an average thickness, so far as proved, of 1 ft. 4 in., and might be advantageously worked in a similar method to the long-wall system of coal-mining. Some of the stone is oxidized, and some has a whitish appearance. The former yields its gold freely; the latter is refractory, and needs separate treatment. The mine is entered by an adit-level above the left-hand branch of Pipe-clay Creek. A small battery (two heads) has been erected, and is driven by water-power. Considerably higher up the creek there is a tunnel on the company's claim at which some work was done several years ago, and Mr. Horn states that 23 dwt. of gold to the ton of stone was obtained. The reef is 2 ft. 6 in. thick, and lies at an angle of about 45 deg.

*Young Australia Quartz-mine, Carrick Range, near Bannockburn. —(18/1/98):* A reef was worked here some twenty years ago by an adit-tunnel and stoped overhead, and also for about 20 ft. underfoot. This latter work admitted of an accumulation of water below adit-level, which caused operations to be suspended. A shaft was subsequently sunk, but, the water proving too much for the primitive appliances available, the ground was abandoned. It is now held by Messrs. McCabe and Sons, who have commenced an adit 90 ft. lower than the original one. It is driven 380 ft. or thereabouts, but is now standing for want of funds. Mr. McCabe estimates that a distance of 300 ft. has yet to be driven to cut the reef, which is said to be 5 ft. thick, and lying at a grade of 1 in 8. The yield is given as 1½ oz. of gold to the ton of stone. The object of this lower tunnel is to gain workable ground, and drain the old workings into Adams's Creek.

*Barewood Quartz-mines, Barewood.*—(21/7/97): This property is now being exploited by the Anglo-Continental Gold Syndicate (Limited) and the London and New Zealand Exploration Company (Limited) jointly. The reef has been traced for two miles and a half on the properties held by the joint companies, and extensive prospecting-works are now in progress. A shaft, estimated to strike the reef at 300 ft., is now down 60 ft.; another shaft, about half a mile distant from the last one, has also been started. Both shafts are 11 ft. 6 in. by 4 ft. inside the timbers, and divided into three compartments. The ground is mica-schist rock, lying horizontally. The reef runs north-west and south-east, and lies at an angle of, say, 56 deg. from the horizontal. A third shaft, 7 ft. by 3 ft. 6 in., at Scott's Gully—sunk by former owners to a depth of 46 ft.—is now being sunk deeper, and at a depth of 150 ft. passed through the reef, which is 7 ft. wide. An adit-tunnel has been commenced from the side of a rocky gorge, through which the Taieri River flows. This tunnel is 7 ft. high, with an average width of 4 ft. 9 in. I understand that the stone will eventually be hauled out of the mine through this tunnel, and the battery be erected somewhere near the tunnel-mouth. This will allow of water-power being used for crushing the stone. Employees at date, thirty-four.

*O.P.Q. Quartz-mine, Waipori (O.P.Q. (Waipori) Gold-mines, Limited).*—(8/3/98): This mine is now being opened by the above-named company, and has an area of 76½ acres. The work in hand comprises—(a) The sinking of a new shaft, 12 ft. 6 in. by 4 ft., which is now 150 ft. down, substantially timbered and divided into three compartments; (b) the driving of a new tunnel on the line of reef (from a point in the gully near to and about the same level as the top of the new shaft), now 450 ft. in; (c) the continuation of an old tunnel at a lower level, now 790 ft. in; and (d) the erection of a battery, &c. The low-level tunnel will reach the shaft at about 900 ft. from the entrance and 70 ft. down the shaft. It will form the adit for the outlet of water from the pumps. At 250 ft. in depth it is proposed to start a level from the shaft, but continue the sinking until the shaft is 500 ft. deep. The present winding plant is of a temporary character; a good plant has been ordered from Robey and Co., Lincoln, England. Twenty-six men at present employed.

*Longwood, Southland.*—(31/8/97): The Longwood Quartz-mining Company's prospecting tunnel is now 950 ft. in, but has not yet struck the reef. This work is subsidised. Found the tunnel in very good order.

*Riverton, Southland.*—(1/9/97): A trial shaft (now 32 ft. down) is being sunk at South Riverton with a view to proving a reef said to have been traced over a mile on the surface. The work is being undertaken by the Riverton Prospecting Association (secretary, A. E. Willetts).

#### HYDRAULIC AND ALLUVIAL MINING.

*Blue Spur and Gabriel's Gully Consolidated Gold Company (Limited), Lawrence.*—(7/5/97): Accompanied by Mr. J. Howard Jackson, C.E., the company's manager, I inspected the works. The ground being operated upon consists of hard concrete wash lying in the form of a trough, one side of which is formed by what Mr. Jackson describes as the "main Blue Spur fault," which has a dip westward, and lies at an angle of 23 deg. from the horizontal. In working, a tunnel is driven from the face of the wash into the body of it for a distance of about 40 ft., from which a couple of short side-drives are cut, the whole forming the shape of the letter T. In the chamber so formed a quantity of roborite (sometimes as much as 15 cwt.) is placed, the chamber stowed up tight, and the charge fired by electricity. This has the effect of loosening the ground, which is afterwards sluiced down, the sluiced stuff being carried by sluice-boxes for convenient distances and elevated by hydraulic elevators to other sluice-boxes at a higher level. By this means excellent opportunities are afforded for saving the gold, as the boxes are of considerable length and well provided with riffles and mattings. The gold is somewhat fine. Forty men are employed on the works and water-races, and every care appears to be taken to insure safety. For some time previous to my visit work had been intermittent owing to scarcity of water. (7/3/98): I again visited the works in company with Mr. Wilson, Inspecting Engineer to the Mines Department. The work is being carried on much in the same way as at my last visit, forty-four men being employed. Two large and three small jets are used for sluicing, and three hydraulic elevators raise the sluiced matter to the boxes.

*Local Industry Gold-mining Company (Limited), Lawrence (J. C. Arbuckle, Secretary).*—(7/3/98): This company has been working a short distance below the Blue Spur workings, but the plant is being removed to Rocky Point, Gabriel's Gully. The company's storage-dam is capable of holding two to three months' water.

*Beaumont Local Industry Co-operative Mining Company (Limited), Beaumont (Secretary, J. C. Arbuckle, Lawrence).*—(9/3/98): Operations have recently been commenced by this company (about half a mile above Beaumont Bridge) to work the alluvial flats alongside the Molyneux River by hydraulic sluicing and elevating. Twenty heads of water are brought in by a race of three miles and a half in length from Beaumont Creek to an elevation of 450 ft. above the claim, and continued in pipes 20 in. in diameter for a distance of 60 chains. The face shows a section of 16 ft. of gravel, overlaid by 12 ft. of sandy stripping, but as the bed-rock appears to dip into the face this thickness will probably be exceeded in a short time. The gold is fine, but easily saved. At present there is nothing but an ordinary sluice-box (with riffles and matting) for saving the gold, but side-tables are to be added shortly. Twelve men are ordinarily employed.

(29/10/97): *Roxburgh Amalgamated Mining and Sluicing Company's Claim* is situated on the eastern side of the Molyneux River opposite the Town of Roxburgh, but practically on the site where the old township formerly stood. The system of work is by hydraulic sluicing and elevating, the wash-dirt being approximately 40 ft. thick, overlaid by 20 ft. to 25 ft. of stripping, principally of a loose sandy nature. The wash is very free working, and does not contain many large stones. Mica-schist forms the bed-rock. This has been worn in places into gutters, which are filled up with wash-dirt. The gold is rather flaky; value, £3 17s. per ounce. Two nozzles and two elevators are usually kept working, a third elevator being kept in readiness for work when either of the

others is stopped. A fourth elevator is used for drainage purposes only. The present prospects of the mine appear good. Twenty-five persons are employed on the claim and water-race.

*No. 1 Hercules Claim, Roxburgh.*—(12/11/97): This is now held by Mr. John Ewing, of St. Bathans, and worked by hydraulic sluicing and elevating. The water-rights to forty-one heads and a half are secured, and a pressure due to a head of 520 ft. is obtained. The gold-bearing wash is 2 ft. thick on the bed-rock, and overlaid by 35 ft. to 40 ft. of drift-gravels. One elevator is used for the sluiced stuff, which is passed over a long sluice-box (having a fall of from 9 in. to 7 in. in 12 ft.) fitted with riffles and matting. A second elevator is used for pumping only. Eight men are at present employed. A new paddock is being opened out and the elevator moved. Mr. Robertson is in charge.

*Ewing's Claim, Bald Hill Flat.*—(12/3/98): The plant has been removed from where Mr. Ewing was working a few months ago to a claim above the Last Chance, and is now being re-erected. The ground will be worked by hydraulic sluicing and elevating. Water is obtained from Coal Creek, Butcher's Creek, and Butcher's Gully, and conveyed in races to a storage dam, which is situated about 1,000 ft. above the claim. The present position of the penstock only gives a head of 180 ft. to the new claim, but it is proposed to extend the pipe-line towards the dam till a working head of 300 ft. is obtained, and re-erect the penstock there. The gold is coarse and easily saved. Area of claim, 30 acres. Ten men employed. Mr. A. McPherson is claim-manager.

*Last Chance Claim, Bald Hill Flat* (Simmons and Hesson; A. McNeece, manager).—(12/3/98): At this claim there is a thickness of from 25 ft. to 30 ft. of wash, resting on a sandy clay bottom, and overlaid by about 5 ft. of surface-soil and -clay. At the time of my visit this surface stuff and the upper part of the wash were being sluiced off. Water is obtained from Shingle, Chasm, and Gorge Creeks. The races will carry fifteen Government heads, but owing to the dry season not more than four heads are at present available. This water is conducted to a reservoir, and gives a six-head supply on the day shift only. Main pipe-line is 15 in. and 13 in. in diameter; service pipes, 11 in., 9 in., and 7 in. in diameter; and a head of 320 ft. is obtained. Two nozzles are ordinarily employed and one elevator, the latter having a lift of 29 ft.; jet, 2½ in. diameter; throat, 7½ in. diameter. Ten men are employed on the claim and water-races. Length of pipes in use, 3,000 ft.

*Carroll and Lynch's Claim, Bald Hill Flat.*—(12/3/98): This claim has an area of 16 acres, 4 acres of which are already worked. Six Government heads of water are brought from Gorge Creek by a race seven miles long, and a working-pressure of 200 ft. (= 86 lb. per square inch) is obtained. The pipe-line tapers from 15 in. to 11 in. pipes, and the service pipes are of 9 in. and 7 in. in diameter, the whole measuring half a mile. Two nozzles are used. The elevator has a lift of 20 ft.; jet, 2 in.; throat, 6 in. At the face there is a section of 15 ft. of wash with a layer of sandy clay and mixed gravel running through it. A layer of surface-clay 5 ft. thick overlies the wash. This was being sluiced off at my visit, and I was informed that it is the practice to regularly clear the top off in this way, the operation taking from two to three weeks every three months. Six men are employed.

*Ophir Deep Lead Gold-mining Company (Limited), Ophir.*—(17/3/98): A claim of 50 acres at Ida Valley (Black's No. 3) has been taken up by this company, and a shaft sunk down for 145 ft.; the last 45 ft. was in schist rock. At 100 ft. deep there is a bed of auriferous wash 4 ft. 6 in. thick, and operations are now about to commence in it. The venture is a new one, and the mine not yet in full working-order. The shaft is 7 ft. 8 in. by 4 ft. 8 in., divided into two compartments, and fitted with a ladder-way. Steam-power is used for winding, and a puddler for breaking the wash and sluice-boxes for saving the gold are now in course of erection. Eleven men are employed.

*Matakanui.*—(1/5/97): Owing to scarcity of water only one claim is at work at date—viz., the Undaunted—where preparations were being made for a wash-up. The Mountain Race Company is now merged into the Undaunted. Claims are as under: Simms and Morgan, when working, employ four men; Ewing and McConnochie, nine men; Undaunted Gold-mining Company, twelve men; Sugar-pot Company, six men; Matakanui Water-race Company, eight men; Sheenan and Barron, two men. The ground in this locality appears rich, and could, I think, be worked to much greater advantage if the whole of the claims were consolidated into one strong company under good management and a really comprehensive water-conservation scheme taken in hand. At present nearly all the claims are idle for want of water. An attempt has been made to prospect the deep lead, and a shaft sunk near Thompson's Gorge to a depth of 65 ft. without coming on to the lead. This matter formed the subject of a special report to the Hon. Minister of Mines under date 10th May, 1897. (16/11/97): All the claims are at work, and a plentiful supply of water has been available since August, but none of the claims have yet washed up since that month. At the prospecting-shaft nothing has been done since my last visit, except to remove the engine. Mr. J. Pitches, of Ophir, has bought the claim, and promised to have the shaft, which I found open and unfenced, properly secured by planking.

*Cardrona.*—(16/10/97): This is an alluvial goldfield, looked upon from a digger's standpoint as being pretty well worked out, but it is more than questionable if it would not be worth attention as a field for dredging operations. There are a few small claims working about the township, but these for the most part are on ground which has been gone over previously. In some cases really good wages are made during eight or nine months in the year during which work can be prosecuted. In midwinter operations are suspended owing to the snow. The claim nearly opposite the Cardrona Hotel yields some nice rough gold. It is worked by a party of tributers, who mine the wash-dirt, and truck it out to boxes at the mine-mouth. Their returns are said to be very satisfactory. The water from this mine is raised by an hydraulic elevator. This and the other claims in the locality are only just now making a start after the usual winter's stoppage. At Criffel Face work is also about being resumed for the season. There are only some half-dozen men there, and these are now engaged in cleaning and repairing the water-races.

*Arrow Falls.*—(18/10/97): Preparations are in hand for fairly extensive working under the direction of Mr. J. Miller. (26/2/98): An Invercargill syndicate has taken up this claim, Mr. Miller

being manager in charge of the works. Twelve men are employed. A full description of the works, and history of the claim, will appear in the report of Mr. Wilson, Inspecting Engineer. The claim appears to be managed very satisfactorily.

*Nokomai.*—(18/2/98): At Mr. Sew Hoy's claim the bed of the Nokomai Creek is being worked. The wash is 47 ft. thick, comparatively fine in character, without many large stones, and rests on a schistose bottom, on which the best gold is found. This is rough, but some fine gold is carried throughout the upper part of the wash. System of working: hydraulic sluicing and elevating. The elevator raises the soakage-water from the creek and the sluiced stuff to a height of 65 ft., using eleven heads of water for this purpose. The sluice-box is 100 ft. long, with a fall of 6½ in. in 12 ft., and fitted with Venetian riffles and matting. Electric light is used for night work. The water-supply is good, and a working-pressure of 240 lb. per square inch obtained. Loss of time owing to dry weather, say, one month in the year. A second elevator is in course of erection. Mr. W. Atkinson is claim-manager. Twenty persons (twelve Chinese and eight Europeans) are employed.

*Parrawa.*—(17/2/98): The Parrawa Water-supply and Gold-mining Company (Limited) commenced operations a few months ago near the banks of the Mataura River, about two miles below Parrawa. Water is brought by a race from Fiery Creek, then siphoned across the river and flats in 13 in. pipes. So far their operations have not been a financial success, the ground being very difficult to work on account of the very large boulders which have to be dealt with. The gold is heavy and rough, but the ground patchy in relation to its contents of the precious metal. Four men are employed.

*Waikaia.*—(8/6/97 and 12/2/98): The Argyle Hydraulic Sluicing Company (Messrs. R. T. Stewart and Co.) work two claims—viz., an ordinary sluicing claim on the terraces and an elevating claim in the bed of the Argyle Stream. At the former the face of wash is about 140 ft. thick, yielding about 10 oz. per week with one nozzle at work. At the lower claim the paddock gives the following average section: Surface-soil and old tailings, 8 ft. to 12 ft.; gravel-wash, 10 ft.; false bottom; gravel-wash, 15 ft.; main bottom (sand): average, 35 ft. Gold is obtained on both false and main bottoms. In working it is the practice to first sluice down to the false bottom for the area of a good-sized paddock, taking the lower bed of gravel at a second working. The elevator has a lift of 42 ft., and uses about ten heads of water under a pressure of 135 lb. to the square inch. The sluice-box is 102 ft. long by 3 ft. wide, with a fall of 8 in. in 12 ft., and fitted with angle-iron riffles and perforated plates underlaid by cocoanut-matting. Both claims take their water from the same service, which comprises twenty miles of races and over a mile of pipes. Area of joint claims, 106 acres. Persons employed, seventeen.

*Waikaia Gold-mining and Water-race Company.*—(12/2/98): This is another private venture, Mr. R. T. Stewart being manager. The claim is situate at Scrubby Terrace, Waikaia, and the face shows a layer of auriferous wash overlaid by 36 ft. of stripping, the top 14 ft. being stiff clay, which has to be made loose with picks before it can be sluiced off. Below the clay, and overlying the auriferous wash, there are 22 ft. of shingly schist and slate. Sixteen heads of water are brought from Steeple Creek by a race eleven miles long, and carried across a gully in 22 in. pipes for a distance of 14 chains. Two 5 in. nozzles are used; head of water, 80 ft. The wash-dirt rests on a false bottom of soft sandstone, in which no gold has been found.

*Kennedy's Claim, Murphy's Hill, near Waikaia.*—(9/6/97): A party of four men work this claim, which has an area of 4 acres. Wash-dirt is from 60 ft. to 100 ft. thick. From 6 ft. to 7 ft. is mined next the bed-rock and wheeled out to the sluice-box. Average yield, 2½ dwt. to 3 dwt. per cubic yard. The ground above would not pay to drive in, but is thought will do very well for sluicing. The workings are kept well timbered and in good order.

*Winding Creek.*—(9/6/97): This claim, formerly known as "Break-em-all," has been taken up by a syndicate. It is intended to work by hydraulic sluicing and elevating on an extensive scale, preparations being made to bring in fifty heads of water. Tenders are now being invited for the work.

*Round Hill Gold-mining Company, Limited* (Manager, Mr. George Lee).—(1/9/97 and 2/9/97): About 100 acres are held by the company. Forty Government heads of water are brought in through water-races, having an aggregate length of sixty miles. A continuation of the main water-race is just about being commenced, to give an increase of twelve Government heads of water from Granity Creek. This extension will be about 9 miles long. At the Ourawera Gorge a new storage reservoir, to hold 23,000,000 gallons of water, is about to be constructed. The main pipe-line has a fall of nearly 300 ft. in 90 chains, the pipes, 27 in. in diameter, being principally made of annealed steel. Branches of from 7 in. to 18 in. in diameter convey the water from the main pipe-line to the various working-places, and give a hydrostatic head of from 300 ft. to 325 ft. The ground in the upper paddock is of a sandy character for the most part and easily sluiced, but considerable labour is entailed in removing buried timber which the sluicing operations expose; evidently this has been either a portion of a submerged forest or a heavy accumulation of drift-wood. In the lower paddock the gold-bearing bottom is overlaid by heavy blue clay and a bed of very inferior lignite, all of which have to be sluiced away. There are four hydraulic elevators with boxes, tables, &c., and another one is in course of erection. The tailings are stacked up well on each side of the waste watercourse by being played upon by a jet from an ordinary sluicing-nozzle with water having about 300 ft. head. The saving-tables are of very large area and well provided with matting and plates; the main boxes are double and provided with ripples and plates. Every care appears to be taken to save the gold, all of which is very fine. It is stated that the value of gold (£3 19s. per ounce retorted) equals about 3½ d. per cubic yard of ground shifted, the working-expenses when all is in proper working-order being about 2½ d. to 2¼ d. per cubic yard. Mr. Lee has patented a new form of elevator-seat for use with hydraulic elevators. Instead of having a circular intake, an oval one provided with a pipe for the admission of air at the mouth is substituted. The air is forced by a very small water-jet. Mr. Lee claims an increase of efficiency by the altered form combined with the air-inlet. He also makes provision for a renewable "throat," thus saving expense in the maintenance of the plant. The pipes used on the works are mostly constructed on

the premises, a very compact plant having been erected for the purpose. The work is carried on at night as well as day, electric lamps being used. The current is generated by a dynamo driven by a Pelton water-wheel, which also provides the power for the workshops. Mr. Lee gives details as follows: Sluicing-nozzle, 2½ in. diameter, uses 3½ Government heads, 300 ft. pressure; elevator jet, 2½ in. diameter, uses 5½ Government heads; elevator has 6½ in. to 7½ in. throat (3 ft. long); casting, 2 ft. 6 in. long, 8 in. to 11 in. diameter; then 13 in. uptake: total lift, 50 ft.; 70 tons of stuff per hour shifted. Forty-seven men are employed by the company. The Round Hill Company supply about a dozen small claims with water when they have it to spare. Ten of these claims are worked by Chinamen (to the number of thirty). Also visited this claim on the 16th February, 1898.

(2/9/97): *O'Brien's Claim* is worked by ground-sluicing. The owner has his own water-race, which carries about one Government head of water, giving a pressure of, say, 100 ft. Working-face 35 ft. to 40 ft. thick.

*Vasey and Brick's Claim* is worked by water obtained from O'Brien.

(2/9/97): *Ourawera Gold-mining Company*.—This claim is near the property held by the Round Hill Company, and the ground is of similar character. One elevator is kept going. It has a lift of about 45 ft. Eleven men and two boys are employed. The arrangements for saving the fine gold are not nearly so complete as those of the Round Hill Company. Also visited this claim on the 16th February, 1898.

*Orepuki*.—(3/9/97 and 4/9/97): There are no large mining works here, although gold-mining provides remunerative labour for a considerable number of men. All the claims are small and, with one or two exceptions, worked by ground-sluicing. The gold is of the same character and of similar value to that at Round Hill. Water is brought principally from the Taunau, the Ourawera, and Waimeamea Streams. McLean and party have recently completed a race of eight miles in length, with a fall of 10 ft. per mile, to carry nineteen Government heads. Of this amount the owners of the race use about four heads at their own claim and sell the remainder to five other claims, three of which are worked by Chinese. The water is sold at £1 5s. per head per week. McLean's claim carries about 1 ft. 6 in. of auriferous wash, overlaid by heavy ground of considerable depth, and a good deal of standing timber has to be dealt with.

At Weston's claim the ground is about 60 ft. deep, the wash-dirt at bottom being 3 ft. thick. This claim and two others adjacent (King and Instone's, and Barry and Sorensen's) labour under the disadvantage of not getting clean water.

Hennessy's claim carries about 4 ft. of rough wash, overlaid by 2 ft. to 3 ft. of sandy wash; above this is about 24 ft. of clay, all of which is removed by ground-sluicing. The claim has not been very long at work. It is situated in the bush, and is higher up the Taunau Creek than any of the other claims.

Love's claim is worked by driving, and Homer's claim is sometimes worked in a similar manner—i.e., when water is not available for sluicing.

At Barry and Sorensen's claim the run of gold-bearing wash ran out about three years ago. Since then the work has consisted in cutting a good channel through the barren ground and otherwise prospecting. It is considered that good ground will very soon be in sight again.

From what I could learn all the claims have paid well, and the digging population appear very comfortably off. There are several other claims not mentioned which I visited, but which do not call for special comment. The Chinese in the district number fourteen.

(15/2/98): A few days prior to my visit quite a mild rush had set in locally on account of a very good find on ground adjoining the north side of King's claim. This has been taken up by a party of five men (B. Rolstone, D. Whelan, T. Warren, and two others), and a shaft 7 ft. by 4 ft. is sunk 42 ft. on to a 2 ft. 6 in. layer of wash, which shows very good prospects. The shaft is to be timbered and a horse-whim erected. "Klondike" is the name by which the claim is to be known. Several other claims are pegged off in the locality.

At J. Forbes's claim three men are engaged ground-sluicing. The auriferous wash varies from 1 ft. to 3 ft., and is overlaid by 20 ft. or more of heavy stripping.

William Forbes's claim adjoins King's, and four men are employed driving in the wash-dirt. The face shows a thickness of 1 ft. The tunnel is well driven and substantially timbered. A new race is being constructed so as to enable this ground to be worked by sluicing. It is said four heads of water will be brought in. Hood and McGauchie have sunk a prospecting-shaft 36 ft. deep, and are now driving an adit from the side of King's claim to work their ground.

McLean's claim is now worked by Chinese (about twenty men), and Love and party have taken a claim in the bush below Hennessy's. They are driving on the wash-dirt. The remaining claims are working much in the same way as at my previous visit (3rd and 4th September, 1897).

#### DREDGING.

This branch of gold-mining is going on apace and is not confined to river-work. Near Waikaka Township there are two dredges working, one of which is fully a mile from the river, and obtains water by a race from a small creek. In my opinion, there are many places in the southern district, and in Southland in particular, where comparatively inexpensive dredges could be profitably employed on alluvial flats.

Owing to the fact of several accidents occurring in connection with dredge-mining I paid special visits to about forty dredges to ascertain what provisions exist for the safety of the employes. In many cases I found that dredge-managers had no idea of their being amenable to any legislative enactments in this direction. There were a few instances where I noticed with much pleasure the care taken to insure safety as far as possible, but in several cases I found a degree of carelessness and indifference which would not be tolerated for a moment in an average coal-mine.

A report (in schedule form) of the dredges visited is given, together with a form of circular letter which I propose to issue to all dredge-masters and secretaries of dredging companies.

## DREDGES VISITED BY ACTING INSPECTOR OF MINES, DUNEDIN.

Name and Situation of Dredge.	Owners.	Dredgemaster.	Persons employed.	Safety Appliances.			Remarks.
				Boats.	Life-belts.	Life-buoys.	
Perry's, Waikaka	J. R. Perry, St. Clair, Dunedin	H. W. Parsons	7	1	..	..	Working on flats away from stream and in dead water about 15 ft. deep. Hull needs a rail or wire fence forward of deck-houses. Dredgemaster promised to have this done.
McGill's, Waikaka	McGill and party, Waikaka	W. McGill	6	1	..	..	Exactly same conditions as above.
Golden Crown, Waikaka	Golden Crown Gold-dredging Company (Limited), Dunedin	..	..	..	..	..	This dredge has so far been unsuccessful, and was being moved up the Waikaka Stream at time of visit.
Golden Terrace No. 1, Lower Shotover, near Arrowtown, Queenstown	Golden Terrace Dredging Company (Limited), Dunedin (R. T. Wheeler, jun., Secretary)	E. A. Johnston	9	1	3	..	Boat-hook also provided. The river here is very rapid. Fencing is fairly good.*
Golden Terrace, No. 2, ditto	Ditto	William Shore	9	1	3	1	Similarly equipped to No. 1 Dredge.*
Perseverance, Waipori	McNeil and Co., Waipori	Thomas Aitken	6	1	..	..	Hull needs fencing beyond the deck-houses (engines and winches). Working in practically dead water. Been at work thirteen months.
Success, Waipori	Success Gold-dredging Company (Limited), Lawrence (J. J. Gibson, Secretary)	William Hanley	7	1	..	..	Recently started (November, 1897). Not yet got on good ground. Working in dead water, quite shallow.
Jutland Flat, Waipori	Jutland Flat (Waipori) Gold-mining Company (Limited), Rattray Street, Dunedin (A. Bartleman, Secretary)	A. R. Edmunds	10	1	..	..	Working on flats in dead water; twelve men are occasionally employed. Area of claim, 244 acres; 90 acres worked in the last seven years. Average depth, 13 ft. below water-level. Fencing is very fair.
Golden Lead (Molyneux River), near Island Block	Golden Lead Dredging Company (Limited), (Isaac Stevenson, Port Chalmers, Secretary)	N. P. Klough	6	2	6	..	Hull, &c., reasonably well fenced. Dredge has only been at work a fortnight after being laid up for some months. Working in the river.
Golden Gate (Molyneux River), near Island Block	Golden Gate Dredging Company (Limited), Roxburgh (Jabez Burton, Secretary)	David Ballantyne	6	2	2	2	Hull is very well fenced. Working in the river.
Otago, Miller's Flat (Molyneux River)	Otago Gold-dredging Company (Limited), Dunedin (A. G. Fenwick, Secretary)	Irie Templeton	6	2	..	..	Machinery generally well fenced. The bevel gear of the top tumbler shaft, being alongside a narrow thoroughfare, needs fencing. Drew attention to this. Well-hole not protected in any way. As the decks are iron, it is necessary the well should be fenced off. Another rail about 8 in. to 12 in. above the deck is required on the fence round the unhoisted portion of the hull. Working at side of river.
Golden Treasure (Molyneux River) Miller's Flat	Golden Treasure Dredging Company (Limited), (J. Burton, Secretary, Roxburgh)	George Bennett	6	3	2	2	Hull fairly well fenced. Screen has only been added recently, and fencing of driving-gear not yet complete. A small breast-rail in front of engine fly-wheel is desirable. Requested this to be fixed. Working at side of river.
Benger Burn, near Roxburgh	Benger Burn Dredging Company (Limited), Roxburgh (J. Burton, Secretary)	James Murray	6	1	..	..	Working on the flats out of the Molyneux River, and in dead water. Area, 40 acres. Been working five months at the rate of about 1 acre per month. Ground, 15 ft. to 20 ft. deep.
Ettrick, Moe Flat, Roxburgh (Molyneux River)	Ettrick Dredging Company (Limited), Roxburgh (J. Burton, Secretary)	John F. Kitto	6	3	3	5	Working in the stream. A gap aft of boiler-house needs fencing. Good provision generally for safety.
Riley's Dredge (late Edina), Roxburgh (Molyneux River)	J. Riley	William Goodwin	7 to 9	2	4	..	This is an old dredge, and was started by Mr. Riley a few months ago (on his purchase) near Dumbarton Rock, but has since been moved up the river three or four miles. Fencing is fair, but in need of repairs. Working in river.
Dunedin, Coal Creek Flat (Molyneux River), Roxburgh	Dunedin Dredging Company (Limited), Bond Street, Dunedin (A. Hamilton, Secretary)	Donald McLellon	8	2	1	3	Iron decks. Well-hole has a wire fence. Hull is not sufficiently fenced; dredgemaster promised to attend to this. Electric light is installed. Working in river.

\* These dredges formerly belonged to the Saw Hay Big Beach Dredging Company before that company went into liquidation.



## DREDGES VISITED BY ACTING INSPECTOR OF MINES, DUNEDIN—continued.

Name and Situation of Dredge.	Owners.	Dredgemaster.	Persons employed.	Safety Appliances.			Remarks.
				Boats.	Life-belts.	Life-buoys.	
Roxburgh, Coal Creek Flat, Roxburgh (Molynaux River)	Endeavour Dredging Company (private), Roxburgh	A. Rennie	6	2	3	4	The Roxburgh Dredging Company (Limited) has gone into liquidation. Present party bought the dredge. Fencing fairly satisfactory except at forward end of hull. This is to be attended to. Working in the river.
McLay's, Lowburn, near Cromwell (Clutha River)	McLay and party	George McLay	6	1	..	..	Well-hole partially fenced. Hull needs fence-rails forward of deck-houses. Working in stream. (Not paying.)
Current-wheel Dredge (Clutha River), Lowburn	Bryce, Klough, and Talboys, Cromwell	William Bryce	3	1	..	..	A current-wheel dredge. Working in the stream. (Not paying.)
Crookston (Clutha River), Cromwell	Crookston and party, Cromwell	William Crookston	6	2	..	..	Machinery well protected, but the hull requires more secure fencing beyond ends of deck-houses. Working in a rapid current. (Not paying.) About to be moored in Kawarau River.
Electric No. 1, Electric No. 2 (Kawarau River), Cromwell	Electric Dredging Company, Dunedin (S. Crow, Dunedin, Secretary)	A. McGeorge	7 7	2 2	4 4	2 2	On river near Bannockburn Bridge, working in rapid current. On river near Cromwell Coal-mine, working in rapid current. Hulls well fenced. Well-holes not fenced. Large dredges, well equipped. Owing to floods bringing a lot of loose drift down the river, these dredges can only work about eight months in the year.
Manuherikia (Molynaux River), Alexandra	Manuherikia Gold-dredging Company (private)	John Mackerney	4	2	3	1	One man per shift can work this dredge (a current-wheeler), but two men are always on board, the off-shift man being provided with a bunk. Dredge works in midstream in Molynaux River, just below mouth of the Manuherikia, but is now undergoing repairs and overhaul. Hull well fenced. The well is protected by a movable platform, in short sections, which is a very satisfactory arrangement. Fencing of hull very inadequate. Well-hole not fenced or protected. Iron decks. Working in banks (out of current).
Enterprise (Molynaux River), Alexandra	Enterprise Dredging Company (No Liability), Rattray Street, Dunedin (C. S. Reeves, Secretary)	Samuel Luke	7	2	2	1	Working in flats away from current. Boat was on beach half a mile away. Iron pontoons and decks. Fencing was very moderate. Stern fence-rail gone, stanchions only left standing.
Ngapara (Molynaux River), Alexandra	Ngapara Dredging Company (private), Alexandra	Robert Ross	6	1	..	..	The largest dredge yet at work. Working in banks at side of river, and out of current. Face—say 30 ft. above water, and 28 ft. below = 58 ft. in all. Most of the hull is housed in. A few slight matters of fencing require attention. No fence to well-hole. The ground above water-level is sluiced down, a duplex pump being used to supply a "director" for the purpose.
Molynaux Hydraulic (Molynaux River), Alexandra	L. G. Ryan, Secretary, Alexandra	L. Gards, managing owner	7	1	..	2	A large modern dredge, working in the river. No attempt to fence the well. Some additions to fencing of hull and machinery to which I draw attention. Consider this dredge should have two boats, also a full complement of life-belts, and that it should be compulsory for men to wear life-belts when shifting lines in connection with this and all other dredges working in swift currents.
Moa (Molynaux River), Alexandra	Clyde Dredging Company (Limited), Dunedin (E. R. Smith, Secretary)	W. S. McCallum	3	1	..	1	One of the earliest dredges, and very small. Formerly a current-wheeler, but converted into a steam-dredge. Fencing, &c., well attended to. Well-hole platformed over. Short length of fencing wanted on hull aft of boiler. One man per shift only. No one sleeps on board. Arranged with the dredgemaster for attention to the details referred to. He promised to provide for accommodation for an off-shift man so as to always have two men on board.
Eureka No. 1 (Molynaux River), Alexandra	Leon and party	J. McDonald	..	..	..	..	

Eureka No. 2, Alexandria ..	Leon and party ..	J. McDonald ..	7	2	1	1	Working near side of river. A well-appointed dredge, and everything on board very satisfactory.
Clyde (Molynaux River), Alexandria	Dr. J. O. Hyde and Company ..	Philip Brennan ..	6	1	..	..	Working in banks away from current. Fencing of hull very unsatisfactory. Iron decks covered with grease (from engines) about the engine-room, and everything in a dirty, slovenly state. Drew attention to requirements, and wrote the management thereon on my return to Dunedin.
Earnsclough No. 1 (Molynaux River), Alexandria	Earnsclough Dredging Company (private), (J. Kelman, Secretary), Alexandria	A. C. Perkins ..	6	2	..	..	A large, modern dredge, working about sixteen months. Hull well fenced. Well not fenced, and only a narrow plank provided for crossing. Fly-wheel of main engine needs fencing. Attention drawn to these matters.
Chicago (Molynaux River), Alexandria	Alexandra Dredging Company (George Spencer)	C. Weaver ..	6	1	..	..	An old dredge, undergoing repairs. Iron pontoons and decks.
Perseverance No. 1 (Molynaux River), Alexandria	Perseverance Gold - dredging Company (private), Alexandria	J. Findlay ..	3	1	8	..	A current-wheel dredge, working in the stream. One man on a shift, but all live on board, so that at least two men are present at any one time. Hull well fenced. Well is crossed by a 2 ft. wide gangway.
Perseverance No. 2 (Molynaux River), Alexandria	Perseverance Gold - dredging Company (private), Alexandria	J. Findlay ..	6	3	..	..	A steam-dredge, with steel hull. Works in bank away from current. Now in course of repairs. Well is crossed by a 3 ft. gangway.
Manorburn (Manuherikia Stream), Alexandria	Manorburn Dredging Company (Limited), Dunedin (Park, Reynolds, and Company Agents)	O. Richardson ..	7	1	..	..	Working in practically dead water. Dredge housed almost all over. Movable hand-rail wanted forward of deck-houses. Well-hole is boxed in. Machinery well protected.
Turakina (Manuherikia Stream), Alexandria	Park, Reynolds, and Company, Dunedin	Herbert Park ..	7	1	..	..	Similarly constructed to last dredge. Electric light fitted. Fencing wanted at foot and top of ladder-way to tables.
Lion Rock (Manuherikia Stream), Alexandria	Lion Rock Gold - dredging Company, (Limited), (Neville Stevwright, Dunedin, Secretary)	O. Richardson ..	6	1	..	..	A new dredge just commencing work. Built on similar lines to the Manorburn Dredge. Hull thoroughly well fenced. Well-hole boxed in. Machinery satisfactorily fenced. Will work in practically dead water.
Guffie's (Maniototo), Naseby	Guffie and party, Naseby	.. ..	..	..	..	..	A new dredge, not yet completed. Expects to be ready to start in about two weeks. (Similar to Lion Rock.)
Little Kyeburn, Naseby ..	Mrs. Silk, Dunedin ..	W. H. Kitto ..	6	..	..	..	An old, small dredge, formerly at Hyde; probably the smallest working dredge in New Zealand. Fencing required on hull.
Kyeburn Gold - dredging Company (Limited), (Kyeburn)	A. M. Comming, Dowling Street, Dunedin, Secretary	J. G. Donaldson ..	6	1	..	..	Formerly at Ophir. Now undergoing alterations. Works in practically dead water, 5 ft. to 9 ft. deep. Fence required forward of deck-house.



(Memorandum No. .)

SIR,— Office of Inspector of Mines (Southern District), Dunedin, 189  
I have to direct your attention to section 29 of "The Mining Act Amendment Act, 1896," which provides that—

- "1. Every dredge used for mining purposes shall at all times be equipped with life-saving appliances to the satisfaction of the Inspector, and shall have at least one suitable boat.
- "2. Every manager who fails or neglects to comply with the provisions of this section is liable for each offence to a penalty not exceeding twenty pounds."

In pursuance of which, notice is hereby given that all dredges must be equipped with safety appliances as under:—

- 2 life-buoys } to be hung in conspicuous places within easy reach fore-and-aft.
- 2 light lines }
- 2 boat-hooks.
- 1 boat, containing a life-buoy, line, and boat-hook.

If working in or adjacent to a current the following additional appliances must be provided, viz.:—

Life-belts to be worn by each member of the crew of any boat while engaged in shifting the lines.

1 extra boat, containing a life-buoy, line, and boat-hook.

Attention is directed to the practice of men stepping on buckets when in motion for the purpose of crossing the well. This is dangerous, and must be strictly prohibited; and, where practicable, the well should be protected by a movable fence, or covered over as much as possible with a platform in, say, 2 ft. sections. Where neither method is practicable a gangway at least 2 ft. 6 in. wide, and fitted with substantial handrails at each side, is to be used for crossing the well.

Where coal, &c., is not brought on board by boats a gangway of sufficient length, not less than 2 ft. 6 in. wide, and fitted with a substantial handrail at each side, must be provided *and used*, as the practice of carrying coal on board a dredge across an unprotected plank or gangway is dangerous.

On dredges which are not entirely covered in, the sides of the uncovered portion of the hull must be fitted with stanchions, not more than 8 ft. apart, and two substantial rails or tightly stretched wires or chains, the lower rail, wire, or chain not being more than 10 in. above the deck; and these may be made movable for the purpose of taking coal, &c., on board, but are to be kept in position at all other times, as the practice of leaving certain portions of the hull unprotected is dangerous.

I have, &c.,

JOHN HAYES,

Acting Inspector of Mines.

To , Dredge-owner or -manager,

### No. 18.

Mr. ALEXANDER AITKEN, Manager, Waimea-Kumara Water-races, to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Kumara, 10th May, 1898.

I have the honour to forward the following report on the Waimea-Kumara Water-races for the year ended the 31st March, 1898:—

#### *Waimea Water-race.*

The total sales of water from this race for the year amounted to £787 18s. 7d., and the expenditure for maintenance during the same period was £677 1s. 6d., showing a credit balance of £110 17s. 1d. on the year's transactions.

The average number of miners supplied with water from the race during the year was 49.5, and the approximate quantity of gold obtained by them was 2,409 oz., having a value of £9,395 2s.

The sales of water are £10 19s. 2d. more than during the preceding year, and the yield of gold is 276 oz. more, having a value of £1,076 8s.

The difference in the sales of water is small, while the difference in the yield of gold is considerable. This is probably accounted for by the fact that the rainfall during the year was large, and the miners had an abundant supply to supplement the water from the race.

The expenditure on ordinary maintenance and repairs is £7 15s. 3d. more than during the preceding year, and the expenditure for maintenance and repairs will continue much the same as during the past two years, as it has now been reduced as much as possible.

Besides the sales of water as above, about £120 of free water has been given to parties who could not afford to pay on account of poor washings; but this would not affect the sales of water, as the water given would otherwise have gone to waste. A considerable amount of waste water was given to parties trying new ground in various parts of the district; but this was only given after all the paying parties had been fully supplied, and principally during wet weather, when there was plenty of water to spare.

#### DEVIATION WAIMEA RACE AT KAWHAKA.

All the work in connection with this deviation has been fully completed, and answers the purpose for which it was intended thoroughly. The deviation will in a few years save much more than its cost, and being all in open cutting, with the exception of about 17 chains of low fluming, there is but little danger of any costly accident or stoppage of the water-supply for the Stafford and Waimea districts. All the timber used in the low fluming is silver-pine, which I am certain has a life of at least forty years. None of the high fluming is in use, and a great portion of it is now down. Any good timber in the old fluming has been taken out and laid aside for future use. This deviation not only carries sufficient water for the supply of Waimea, Stafford, and Callaghan's when there is enough in the Kawhaka Creek for so doing, but it also largely supplements the Kumara supply when there is plenty of water in the Kawhaka Creek.

#### BRANCH RACE TO CALLAGHAN'S.

The total sales of water from this race during the year amounted to £172, and the expenditure for maintenance and repairs was £125 5s., showing a credit balance of £46 15s. The sales of water from this race have not come up to expectations, although they have to some extent increased. Sluicing on a large scale has not yet been tried in this district, but some parties are now prepared to give it a fair trial with giant nozzles and quantities of water like those in use in Kumara. The average number of miners supplied with water from this race during the year was 7·37, and the approximate quantity of gold obtained by them was 315 oz., having a value of £1,228 10s.

#### BRANCH RACE TOWARDS MIDDLE BRANCH, WAIMEA CREEK.

Very little work has been done on this race during the year, as no water would be required from it until the Waimea Main Tail-race was completed. Surveys have been made of two dam-sites, and branch races therefrom, for the supply of water to the claims that will discharge into the Waimea Main Tail-race, but the settlement of these has been greatly obstructed by a few of the residents of Waimea and Stafford, who have marked out a dam-site and branch-race right, evidently with the intention of obtaining compensation from the Government. I am, however, of opinion that all necessary rights will be obtained shortly without payment of any kind to the parties referred to. A dam to hold night-water and water that would otherwise go to waste on Sundays and holidays, with a branch race leading to the claims, is absolutely necessary for the economical working of the large flat in the Middle Branch, which I feel confident will pay well as soon as the Waimea Main Tail-race is completed and sluicing operations fairly started. The construction of dam and branch race should be started as soon as proper rights have been obtained.

#### WAIMEA MAIN TAIL-RACE.

The Waimea Main Tail-race has been completed, and connected with the surface by a shaft, sunk near the Hokitika Main Road, in the Middle Branch of the Waimea Creek. The total length is 2,076 ft., and it is boxed and blocked throughout. The shaft requires to be timbered, and a few sets of timber will be necessary in the race where the shaft joins it, and the branch tail-races from the claims in the vicinity may then be connected with the main tail-race. As soon as this work is done, and the branch race for the supply of water completed, sluicing may be started in the Middle Branch, and, as it is almost a certainty the ground will pay well, many claims will be opened up and worked, and a larger number of miners employed who will use the water from the Government race.

#### KELLY'S TERRACE DRAINAGE TUNNEL.

The Kelly Terrace Drainage Tunnel has been driven a total distance of 2,602 ft., but the contractors have suspended work since December last, as the distance the stuff had to be trucked rendered operations too slow, and the contract would not pay enough to keep them going. Negotiations for the sinking of a shaft, which will improve the air and facilitate operations, are in progress, and work is likely to proceed again. No payable wash has yet been cut through. The proposed total length of the tunnel is 6,600 ft., so that about 4,000 ft. has still to be driven to the proposed termination.

I have, &c.,

A. AITKEN, Manager.

#### No. 19.

Mr. RODERICK MURRAY, Manager of the Mount Ida Water-race, to the UNDER-SECRETARY for MINES, Wellington.

SIR,—

Naseby, 21st April, 1898.

I have the honour to submit the following report on the Mount Ida and Blackstone Hill Water-races for the year ending the 31st March, 1898.

#### MOUNT IDA WATER-RACE.

The total sales of water from this race during the year amounted to £1,395 18s. 11d., and the expenditure on maintenance and repairs for the same period £1,384 18s. 9d. The total cash received was £1,425 12s. 2d. On account of payment in advance free water to the value of £74 11s. 7d. was supplied. Free water to the value of £16 13s. 8d. was supplied to assist in opening up new claims, and free water for washing was also supplied to the value of £102 16s. 2d. The total value of water supplied from this race during the year was £1,590 0s. 4d. The average number of miners supplied with water was sixty-one, a decrease of 5·5 from that of last year, and the approximate quantity of gold obtained by parties using water from the race was 2,885 oz., valued at £11,107 5s.

During the month of April I had to reface with sods the water-face of three of the dams, the old sod facing being almost all washed away; also, to replace an old flume 2½ chains in length, and a short one that was in a bad position, by iron pipes. None of this will have to be done again for many years. I started to clean out the race on the 2nd August, when on the third day after starting it again commenced to snow and freeze, when all work had to be suspended until the 19th. The widening of four miles from Home Gully Dam to Coalpit Gully was done while the race was being cleaned out. This now allows when there is plenty of water to keep all the claims on the east side of Main Gully in full work during the daytime. The cleaning was finished on the 10th September. The year has been the driest on record, the snow being all gone by the end of November. The water-supply from the beginning of December kept

steadily falling until by the middle of March there was only a head and a half in the race. Four new elevating claims started to work in the spring, making now eight elevating claims supplied with water from the Mount Ida Water-race.

McConnochie and Kennedy having abandoned their claim at Johnstone's Creek, the place is now deserted.

A portion of the siphon crossing Wet Gully is leaking so badly from corrosion that it will have to be replaced. As it is covered to a depth of 8 ft. by tailings I cannot say how much, but do not think there can be more than 30 ft. This can be done by the maintenance-men during winter, when the water is off. The race has been kept in a good state of repair during the year by the maintenance-men.

#### BLACKSTONE HILL WATER-RACE.

The total sales of water from this race amounted to £126 16s. 1d., and the total cash received was £126 16s. 1d. The total water supplied amounted to £126 16s. 1d. The total cost of maintenance and repairs was £30 10s. In May I had to give the race a partial side-trimming, as the side-growth was so heavy that frost would stop the water from getting through. Repairs had to be made on the tunnel crossing the main road in Johnstone's tail-race, as the rock kept crumbling away. In February, the water-supply being so low, I took the opportunity of having the race cleaned out; it is now in good working-order and will require very little being done to it for some time to come. Since December the water-supply has been very low, not enough to keep the two first rights supplied. The average number of miners supplied with water from this race during the year was 8·75, the same as last year; and the approximate quantity of gold obtained was 160 oz., valued at £616.

I have, &c.,

The Under-Secretary for Mines, Wellington.

R. MURRAY, Manager.

---

## APPENDIX.

## No. 1.

STATEMENT showing the REVENUE of the GOLDFIELDS collected in the several DISTRICTS, and the GOLD DUTY of the COLONY of NEW ZEALAND, for the Period from the 1st January to the 31st December, 1897.

District.	Miners' Rights.	Business Licenses, Machine and Residence Sites.	Water-races, Sluices, &c.	Gold-mining Leases, Rents, and Royalties.	Registration.	Fees and Fines, Wardens' Courts.	Miscellaneous.	Totals.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
<b>AUCKLAND.</b>								
Coromandel ..	450 10 0	172 10 0	13 0 0	4,813 14 6	55 16 0	63 15 0	511 13 0	6,080 18 6
Te Aroha ..	65 10 0	796 0 0	30 5 0	830 15 0	8 12 0	6 6 0	1 7 0	1,738 15 0
Thames ..	673 10 0	26 0 0	17 5 0	8,624 18 5	49 19 0	54 9 0	455 8 0	9,901 9 5
Ohinemuri ..	599 0 0	193 10 0	14 0 0	12,285 2 8	58 4 0	..	475 1 7	13,624 18 3
Puhipuhi ..	14 0 0	2 0 0	..	373 8 3	..	..	0 5 0	339 8 3
Tauranga ..	5 0 0	..	..	25 0 0	0 3 0	1 4 0	..	31 7 0
<b>Totals ..</b>	<b>1,807 10 0</b>	<b>1,190 0 0</b>	<b>74 10 0</b>	<b>26,952 18 10</b>	<b>172 14 0</b>	<b>125 14 0</b>	<b>1,443 14 7</b>	<b>31,766 16 5</b>
<b>NELSON.</b>								
Collingwood ..	64 10 0	3 0 0	6 5 0	515 0 0	12 1 0	12 9 0	109 16 0	723 1 0
Westport ..	237 10 0	15 12 0	17 15 0	1,754 1 5	17 9 0	45 15 0	222 15 2	2,310 17 7
Charleston ..	85 12 0	..	10 5 0	189 16 0	7 0 0	0 3 0	15 12 0	308 8 0
Ahaura ..	249 10 0	..	19 0 0	724 5 0	28 18 0	5 16 0	43 13 8	1,071 2 8
Reefton ..	227 0 0	10 10 0	13 0 0	2,894 5 0	14 16 0	24 16 0	231 12 0	2,965 19 0
Wangapeka ..	18 10 0	..	0 5 0	..	0 12 0	..	1 7 6	20 14 6
Lyell ..	52 10 0	..	4 0 0	238 9 0	2 15 0	..	2 7 0	300 1 0
Motueka ..	2 11 0	..	..	3 15 0	0 14 0	..	0 1 0	7 1 0
Murchison and Owen's	18 10 0	3 0 0	6 2 6	122 16 6	5 8 0	..	1 14 0	157 11 0
<b>Totals ..</b>	<b>956 3 0</b>	<b>32 2 0</b>	<b>76 12 6</b>	<b>5,942 7 11</b>	<b>89 13 0</b>	<b>88 19 0</b>	<b>678 18 4</b>	<b>7,864 15 9</b>
<b>MARLBOROUGH.</b>								
Havelock ..	55 0 0	3 0 0	3 10 0	281 3 0	4 19 0	7 1 0	26 7 0	381 0 0
<b>WESTLAND.</b>								
Hokitika and Kaniere	174 0 0	3 0 0	7 0 0	291 1 6	12 8 0	7 14 0	8 17 1	504 0 7
Greymouth ..	319 10 0	2 11 0	26 7 6	1,079 5 6	24 1 0	35 3 0	1,169 13 6	2,656 11 6
Ross ..	34 10 0	1 0 0	3 10 0	353 10 6	4 14 0	0 16 0	1 3 6	399 4 0
Stafford ..	79 0 0	1 0 0	6 17 6	65 0 6	5 19 0	6 16 0	232 18 6	447 11 6
Kumara ..	247 0 0	1 10 0	3 12 6	300 4 9	16 8 0	11 17 0	0 2 6	580 14 9
Goldsborough ..	68 2 0	..	11 5 0	..	9 4 0	..	2 18 0	91 9 0
Okarito ..	26 0 0	1 10 0	1 0 0	37 10 0	2 2 0	0 4 0	..	68 6 0
<b>Totals ..</b>	<b>948 2 0</b>	<b>10 11 0</b>	<b>59 12 6</b>	<b>2,126 12 9</b>	<b>74 16 0</b>	<b>62 10 0</b>	<b>1,465 13 1</b>	<b>4,747 17 4</b>
<b>OTAGO.</b>								
Tapanui ..	8 0 0	..	..	11 10 0	1 3 0	..	..	20 13 0
Hindon ..	109 10 0	7 2 0	3 0 0	631 7 3	6 9 0	1 4 0	1 18 6	760 10 9
Naseby ..	158 0 0	29 0 0	45 17 6	744 4 0	25 18 0	24 15 0	349 19 3	1,377 13 9
Roxburgh	..	..	..	..	..	..	..	..
Alexandra	..	..	..	..	..	..	..	..
Clyde ..	471 10 0	15 10 0	25 17 6	1,887 10 5	36 15 0	35 9 0	100 14 0	2,573 5 11
Black's	..	..	..	..	..	..	..	..
Pembroke ..	21 0 0	..	2 0 0	8 12 0	1 15 0	..	..	33 7 0
Cromwell ..	230 12 0	6 2 0	12 12 6	953 4 7	26 1 0	28 3 6	310 15 1	1,627 10 8
Queenstown ..	199 0 0	24 0 0	5 10 0	754 10 5	12 17 0	76 5 0	115 12 6	1,187 14 11
Arrowtown ..	95 0 0	..	7 2 6	355 8 6	11 3 0	7 8 0	2 8 0	478 5 0
Lawrence ..	281 12 0	3 0 0	22 10 0	1,962 14 0	16 16 0	38 11 0	2 2 0	1,727 5 0
Waikaia ..	130 11 0	6 0 0	13 0 0	404 7 6	13 1 0	9 0 6	4 8 6	580 8 6
Orepuki ..	93 0 0	..	..	..	..	..	..	93 0 0
Riverton and Longwood	184 0 0	14 11 0	22 10 0	640 1 0	18 14 0	38 9 6	8 18 6	927 4 0
Maerewhenua ..	5 10 0	..	4 10 0	3 17 6	3 18 0	..	44 11 0	62 6 6
Wyndham ..	7 10 0	0 10 0	..	12 13 0	1 3 0	..	..	21 16 0
Nenthorn ..	2 0 0	..	..	..	..	..	..	2 0 0
Middlemarch ..	4 10 0	..	..	..	..	..	..	4 10 0
<b>Totals ..</b>	<b>2,061 5 0</b>	<b>105 15 0</b>	<b>164 10 0</b>	<b>7,770 0 2</b>	<b>175 13 0</b>	<b>259 5 6</b>	<b>941 2 4</b>	<b>11,477 11 0</b>
<b>Grand totals ..</b>	<b>5,828 0 0</b>	<b>1,341 8 0</b>	<b>378 15 0</b>	<b>43,072 17 8</b>	<b>517 15 0</b>	<b>543 9 6</b>	<b>4,555 15 4</b>	<b>56,238 0 6</b>

## No. 2.

STATEMENT showing the REVENUE of the GOLDFIELDS collected in the several DISTRICTS, and the GOLD DUTY of the COLONY of NEW ZEALAND, for the Period from 1st January to 31st March, 1898.

District.	Miners' Rights.	Business Licenses, Machine and Residence Sites.	Water-races, Sluices, &c.	Gold-mining Leases, Rents, and Royalties.	Registration.	Fees and Fines, Wardens' Courts.	Miscellaneous.	Totals.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
AUCKLAND.								
Coromandel ..	67 0 0	7 10 0	1 5 0	501 7 6	6 18 0	24 4 0	58 15 0	666 19 6
Te Aroha ..	12 0 0	378 10 0	18 0 0	242 19 0	1 3 0	3 14 0	..	656 6 0
Ohinemuri ..	149 0 0	52 5 0	2 15 0	1,705 3 3	5 7 0	..	1,101 8 7	3,015 18 10
Thames ..	156 10 0	6 0 0	2 5 0	1,063 15 1	10 18 0	18 13 0	33 19 6	1,292 0 7
Puhipuhi ..	9 10 0	..	0 5 0	112 0 0	0 2 0	..	4 8 5	126 5 5
Tauranga ..	1 10 0	..	..	12 5 0	0 8 0	..	..	14 3 0
Totals ..	395 10 0	444 5 0	24 10 0	3,637 9 10	24 16 0	46 11 0	1,198 11 6	5,771 13 4
NELSON.								
Motueka ..	1 0 0	..	0 5 0	..	0 4 0	..	1 5 0	2 14 0
Collingwood ..	13 18 0	1 0 0	2 10 0	113 18 0	2 14 0	1 3 0	14 4 0	149 7 0
Westport ..	48 0 0	0 3 0	1 10 0	1,485 18 6	4 0 0	15 3 0	115 11 4	1,670 5 10
Charleston ..	27 10 0	..	2 17 6	96 9 0	1 15 0	..	1 4 0	129 15 6
Ahaura ..	80 10 0	..	3 5 0	378 0 0	5 13 0	..	33 13 9	501 1 9
Reefton ..	57 10 0	..	2 10 0	984 8 9	3 11 0	11 18 8	56 18 0	1,116 16 5
Wangapeka ..	15 10 0	..	0 1 0	..	0 3 0	..	0 8 0	16 2 0
Lyell ..	5 0 0	..	..	130 15 0	0 16 0	..	0 4 0	136 15 0
Murchison ..	2 10 0	..	0 15 0	78 11 0	0 11 0	..	0 5 0	77 12 0
Totals ..	251 8 0	1 3 0	13 13 6	3,263 0 3	19 7 0	28 4 8	223 13 1	3,800 9 6
MARLBOROUGH.								
Havelock ..	19 0 0	3 0 0	1 15 0	94 1 4	2 4 0	..	0 9 6	120 9 10
Picton ..	..	..	..	..	..	..	..	..
WESTLAND.								
Hokitika and Kaniere ..	33 10 0	..	1 2 6	71 7 6	2 5 0	1 10 0	1 14 8	111 9 8
Greymouth ..	76 0 0	0 1 0	6 10 0	589 7 6	5 16 0	4 15 0	0 6 6	682 16 0
Ross ..	12 0 0	..	0 5 0	38 2 0	0 17 0	0 9 0	0 1 0	51 14 0
Stafford ..	13 0 0	..	2 0 0	23 10 0	1 14 0	0 8 0	29 14 6	70 6 6
Okarito ..	9 0 0	..	0 10 0	12 10 0	0 11 0	..	..	22 11 0
Kumara ..	59 0 0	..	0 15 0	58 7 6	3 5 0	0 10 0	27 11 0	149 8 6
Goldsborough ..	19 0 0	..	2 2 6	..	1 18 0	..	0 15 0	23 15 6
Totals ..	221 10 0	0 1 0	13 5 0	793 4 6	16 6 0	7 12 0	60 2 8	1,112 1 2
OTAGO.								
Middlemarch ..	0 10 0	..	..	..	..	..	..	0 10 0
Tapanui ..	1 10 0	..	..	..	..	..	..	1 10 0
Hindon ..	19 10 0	2 5 0	..	193 17 6	0 13 0	..	0 5 0	216 10 6
Naseby ..	35 0 0	7 10 0	19 17 6	258 5 6	6 11 0	5 19 0	90 17 9	424 0 9
Black's ..	..	..	..	..	..	..	..	..
Alexandra ..	..	..	..	..	..	..	..	..
Clyde ..	78 10 0	..	7 17 6	729 6 6	12 9 0	8 9 0	6 19 0	843 11 0
Roxburgh ..	..	..	..	..	..	..	..	..
Cromwell ..	84 5 0	0 1 0	2 17 6	155 16 6	6 2 0	7 17 0	120 16 6	377 15 6
Queenstown ..	68 0 0	18 0 0	1 10 0	387 4 11	9 13 0	0 18 0	121 15 0	607 0 11
Arrowtown ..	29 0 0	..	2 10 0	62 18 0	3 7 0	1 5 0	..	99 0 0
Lawrence ..	62 1 0	1 0 0	4 17 6	191 0 4	4 9 0	82 12 0	1 1 0	297 0 10
Orepuki ..	..	..	..	..	..	..	..	..
Riverton and Longwood ..	39 10 0	3 0 0	2 15 0	120 8 6	4 6 0	4 18 0	5 2 0	179 19 6
Pembroke ..	2 10 0	..	..	..	0 2 0	..	..	2 12 0
Maerewhenua ..	..	..	0 7 6	..	2 4 0	..	3 16 0	6 7 6
Waikaia ..	35 0 0	3 0 0	2 0 0	105 15 0	2 8 0	0 15 0	0 8 0	149 6 0
Wyndham ..	2 10 0	..	..	0 13 0	0 10 0	..	..	3 13 0
Nenthorn ..	1 10 0	..	..	..	..	..	..	1 10 0
Totals ..	459 6 0	34 16 0	44 12 6	2,205 5 9	52 14 0	62 13 0	351 0 3	3,210 7 6
Grand totals ..	1,346 14 0	483 5 0	97 16 0	9,993 1 8	115 7 0	145 0 8	1,833 17 0	14,015 1 4

## No. 3.

COMPARATIVE RETURN of REVENUE derived from the GOLDFIELDS in the several DISTRICTS of NEW ZEALAND during the Years 1896 and 1897, showing INCREASE or DECREASE under each Head of Revenue.

District.	Miners' Rights.	Business Licenses, &c.	Water-races, Sluices, &c.	Gold-mining Leases, Rents, and Royalties.	Registration.	Fees and Fines, Wardens' Courts.	Miscellaneous.	Gold Duty.	Totals.
AUCKLAND—	£	£	£	£	£	£	£	£	£
Year 1896 .. ..	3,955	529	76	28,362	216	342	1,084	9,902	44,466
Year 1897 .. ..	1,807	1,190	74	26,953	173	126	1,444	10,403	42,170
Increase .. ..	..	661	..	..	..	..	360	501	..
Decrease .. ..	2,148	..	2	1,409	43	216	..	..	2,296
NELSON—									
Year 1896 .. ..	1,244	35	122	5,273	111	55	697	..	7,537
Year 1897 .. ..	956	32	77	5,942	90	89	679	..	7,865
Increase .. ..	..	..	..	669	..	34	..	..	328
Decrease .. ..	288	3	45	..	21	..	18	..	..
MARLBOROUGH—									
Year 1896 .. ..	46	1	5	216	3	..	1	..	272
Year 1897 .. ..	55	3	3	281	5	7	26	..	380
Increase .. ..	9	2	..	65	2	7	25	..	108
Decrease .. ..	..	..	2	..	..	..	..	..	..
WESTLAND—									
Year 1896 .. ..	1,174	15	77	3,305	83	38	307	..	4,999
Year 1897 .. ..	948	11	60	2,126	75	62	1,465	..	4,747
Increase .. ..	..	..	..	..	..	24	1,158	..	..
Decrease .. ..	226	4	17	1,179	8	..	..	..	252
OTAGO—									
Year 1896 .. ..	1,848	97	172	6,014	160	105	700	..	9,096
Year 1897 .. ..	2,061	106	164	7,770	175	259	941	..	11,476
Increase .. ..	213	9	..	1,756	15	154	241	..	2,380
Decrease .. ..	..	..	8	..	..	..	..	..	..
Total Increase .. ..	..	665	..	..	..	3	1,766	501	268
Total Decrease .. ..	2,440	..	74	98	55	..	..	..	..

## No. 4.

COMPARATIVE RETURN of the TOTAL AMOUNTS of GOLDFIELDS REVENUE (exclusive of Gold Duty) collected in the several Districts during the Years 1896 and 1897, and the Quarters ending 31st March, 1897 and 1898 respectively, showing the INCREASE or DECREASE in respect of each District.

District.	Years 1896 and 1897.				Quarters ending 31st March, 1897, and 31st March, 1898.			
	1897.	1896.	Increase.	Decrease.	1897.	1898.	Increase.	Decrease.
AUCKLAND.								
Coromandel .. ..	£ 6,081	£ 8,246	£ ..	£ 2,165	£ 1,977	£ 667	£ ..	£ 1,810
Te Aroha .. ..	1,739	1,806	..	67	517	656	139	..
Thames .. ..	9,902	9,274	628	..	3,183	1,292	..	1,891
Puhipuhi .. ..	389	644	..	255	96	126	30	..
Ohinemuri .. ..	13,625	14,592	..	967	4,976	3,016	..	1,960
Tauranga .. ..	31	..	31	..	..	14	14	..
NELSON.								
Motueka .. ..	7	13	..	6	1	3	2	..
Collingwood .. ..	723	713	10	..	149	149	..	..
Westport .. ..	2,312	975	1,337	..	409	1,670	1,262	..
Charleston .. ..	308	208	100	..	101	130	29	..
Ahaura .. ..	1,071	1,155	..	84	382	500	119	..
Reefton .. ..	2,966	4,018	..	1,052	963	1,117	155	..
Wangapeka .. ..	21	25	..	4	5	16	11	..
Lyell .. ..	300	265	35	..	61	137	76	..
Murchison and Owen's ..	158	165	..	7	48	78	30	..
MARLBOROUGH.								
Havelock .. ..	381	272	109	..	26	120	95	..
Picton .. ..								
WESTLAND.								
Hokitika .. ..	504	482	22	..	157	111	..	46
Kanieri .. ..								
Greymouth .. ..	2,657	3,064	..	407	414	683	269	..
Ross .. ..	399	449	..	50	156	52	..	104
Stafford .. ..	448	200	248	..	126	70	..	56
Okarito .. ..	68	38	30	..	13	23	10	..
Kumara .. ..	580	675	..	95	196	149	..	47
Goldsborough .. ..	92	92	..	..	24	24	..	..
OTAGO.								
Hindon .. ..	761	447	314	..	140	216	76	..
Naseby .. ..	1,378	1,355	23	..	440	424	..	16
Alexandra .. ..	2,573	1,817	756	..	417	844	427	..
Black's .. ..								
Clyde .. ..	1,627	1,141	486	..	472	378	..	94
Roxburgh .. ..								
Cromwell .. ..	478	494	..	16	50	99	49	..
Arrowtown .. ..	1,187	1,091	96	..	445	607	162	..
Queenstown .. ..	33	26	7	..	10	3	..	7
Pembroke .. ..	1,727	1,207	520	..	371	297	..	74
Lawrence .. ..	580	501	79	..	116	149	33	..
Waikaia .. ..	21	10	11	..	4	2	..	2
Tapanui .. ..	1,020	675	345	..	249	180	..	69
Orepuki, Preservation, and Longwood .. ..	63	49	12	..	31	6	..	25
Maerewhenua .. ..	22	30	..	8	4	4	..	..
Wyndham .. ..	2	254	..	252	14	2	..	12
Nenthorn .. ..	4	..	4	..	..	1	1	..
Middlemarch .. ..								
Totals .. ..	56,238	56,468	..	..	16,743	14,015	..	..
Net decrease .. ..	..	..	..	230	..	..	..	2,728

## No. 5.

RETURN of GOLD DUTY credited to LOCAL BODIES for the Year ended 31st December, 1897, and Quarter ended 31st March, 1898.

Local Body.				For the Year ended 31st December, 1897.			For the Quarter ended 31st March, 1898.		
COUNTIES—				£	s.	d.	£	s.	d.
Coromandel ..	..	..	..	1,876	12	1	548	14	9
Ohinemuri ..	..	..	..	7,564	8	1	2,453	9	5
Piako ..	..	..	..	16	0	0	0	0	2
Thames ..	..	..	..	418	15	1	50	1	6
Whangarei ..	..	..	..	..	..	..	..	..	..
BOROUGH—									
Thames ..	..	..	..	527	2	1	57	12	3
Totals ..	..	..	..	10,402	17	4	3,109	18	1

The Treasury, Wellington, 24th June, 1898.

ROBERT J. COLLINS,  
Accountant to the Treasury.

## No. 6.

RETURN of the QUANTITY and VALUE of GOLD ENTERED for DUTY\* for EXPORTATION from NEW ZEALAND from 1st APRIL, 1857, to 31st DECEMBER, 1897.

PRODUCE OF THE GOLDFIELDS IN		DURING THE QUARTER ENDED 31st DEC., 1897.		ENTERED FOR EXPORTATION TO THE 30th SEPT., 1897.		TOTAL ENTERED FOR EXPORTATION FROM NEW ZEALAND TO THE 31st DEC., 1897.	
County or Borough.	District.	Qu'ntity	Value.	Quantity.	Value.	Quantity.	Value.
County of Coromandel ..	Auckland	Oz.	£	Oz.	£	Oz.	£
Thames ..		4,986	21,065				
Ohinemuri ..		505	2,131				
Piako ..		24,049	85,140				
Borough of Thames ..		572	2,415				
		30,112	110,751	2,107,858	7,948,643	2,137,970	8,059,394
	Wellington ..	..	..	188	706	188	706
	Marlborough ..	..	..	85,604	333,412	85,604	333,412
County of Collingwood ..	Nelson ..	130	520	1,673,009	6,632,643	1,673,139	6,633,163
County of Buller ..	West Coast	2,412	9,649				
Inangahua ..		1,449	5,797				
Grey ..		3,693	14,772				
Westland ..		3,227	12,909				
Borough of Kumara ..		34	135				
Hokitika ..		97	388				
		10,912	43,650	4,288,778	17,054,955	4,299,690	17,098,605
	Canterbury ..	..	..	24	96	24	96
County of Taieri ..	Otago	640	2,461				
Tuapeka ..		5,757	23,191				
Vincent ..		6,746	27,033				
Maniototo ..		1,179	4,691				
Waihemo ..		111	453				
Waitaki ..		366	1,457				
Lake ..		1,224	5,016				
Wallace ..		1,680	6,751				
Waikouaiti ..		94	385				
Bruce ..		271	1,091				
Fiord ..		1,642	6,576				
Southland ..		892	3,590				
		20,602	82,695	5,348,213	21,164,079	5,368,815	21,246,774
	Unknown ..	..	..	122	484	122	484
Totals ..	..	61,756	237,616	13,503,796	53,135,018	13,565,552	53,372,634

## No. 7.

COMPARATIVE RETURN of the QUANTITY and VALUE of GOLD ENTERED for DUTY\* for EXPORTATION from NEW ZEALAND for the YEARS ended 31st DECEMBER, 1897 and 1896.

PRODUCE OF THE GOLDFIELDS IN THE DISTRICT OF	DURING THE QUARTER ENDED—				TOTALS FOR YEAR 1897.		TOTALS FOR YEAR 1896.	
	31st March, 1897.	30th June, 1897.	30th September, 1897.	31st December, 1897.	Quantity.	Value.	Quantity.	Value.
	Oz.	Oz.	Oz.	Oz.	Oz.	£	Oz.	£
Auckland ..	26,392	23,571	25,402	30,112	105,477	392,337	92,346	350,355
Marlborough ..	351	436	23	..	810	3,195	916	3,588
Nelson ..	1,184	..	626	130	1,892	7,055	2,753	10,333
West Coast ..	17,903	12,746	17,256	10,912	58,817	235,430	79,817	317,161
Otago ..	23,841	23,293	16,913	20,602	84,649	342,187	88,362	359,991
Totals for 1897	69,621	60,046	60,222	61,756	251,645	980,204	..	..
Totals for 1896	76,402	44,208	76,051	67,033	..	..	263,694	1,041,428

\* Gold duty abolished in the South Island on the 31st March, 1891, by "The Gold Duty Abolition Act, 1890."

Department of Trade and Customs,  
Wellington, 20th January, 1898.

W. T. GLASGOW,  
Secretary and Inspector.



## No. 8.

RETURN of the QUANTITY and VALUE of GOLD ENTERED for DUTY\* for EXPORTATION from NEW ZEALAND from 1st APRIL, 1857, to 31st MARCH, 1898.

PRODUCE OF THE GOLDFIELDS IN		DURING THE QUARTER ENDED 31st MARCH, 1898.		ENTERED FOR EXPORTATION TO THE 31st DECEMBER, 1897.		TOTAL ENTERED FOR EXPORTATION FROM NEW ZEALAND TO THE 31st MARCH, 1898.	
County or Borough.	District.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Oz.	£	Oz.	£	Oz.	£
County of Coromandel	Auckland	5,488	23,268				
Thames ..		1,204	4,928				
Ohinemuri ..		21,302	76,886				
Borough of Thames ..		1,411	5,790				
		29,405	110,872	2,137,970	8,059,894	2,167,375	8,170,266
	Wellington ..	..	..	188	706	188	706
County of Marlborough	Marlborough ..	160	597	85,604	333,412	85,764	334,009
	Nelson ..	..	..	1,673,139	6,633,163	1,673,139	6,633,163
County of Buller ..	West Coast	1,342	5,867				
Inangahua ..		3,813	15,254				
Grey ..		9,653	38,611				
Westland ..		9,129	36,516				
Borough of Hokitika ..		115	459				
Kumara ..		118	473				
Ross ..		1,037	4,149				
		25,207	100,829	4,299,690	17,098,605	4,324,897	17,199,434
	Canterbury ..	..	..	24	96	24	96
County of Taieri ..	Otago	329	1,295				
Lake ..		1,771	7,260				
Vincent ..		3,224	13,088				
Maniototo ..		2,068	8,884				
Waitaki ..		524	2,114				
Waihemo ..		161	660				
Wallace ..		1,640	6,617				
Clutha ..		12	50				
Tuapeka ..		3,649	14,752				
Southland ..		799	3,216				
Bruce ..		238	952				
Fiord ..		281	1,124				
		14,696	59,512	5,368,815	21,246,774	5,383,511	21,306,286
Unknown ..	..	..	..	122	484	122	484
Totals ..	..	69,468	271,810	13,565,552	53,372,634	13,635,020	53,644,444

\* Gold duty abolished in the South Island on the 31st March, 1891, by "The Gold Duty Abolition Act, 1890."

## No. 9.

COMPARATIVE RETURN for the QUARTERS ended 31st MARCH, 1898, and 31st MARCH, 1897.

District of				Quarter ended 31st March, 1898.		Quarter ended 31st March, 1897.	
				Quantity.	Value.	Quantity.	Value.
				Oz.	£	Oz.	£
Auckland ..	..	..	..	29,405	110,872	26,392	101,607
Marlborough ..	..	..	..	160	597	351	1,392
Nelson ..	..	..	..	..	..	1,134	4,202
West Coast ..	..	..	..	25,207	100,829	17,908	71,778
Otago ..	..	..	..	14,696	59,512	23,841	96,887
Totals ..	..	..	..	69,468	271,810	69,621	275,816

Department of Trade and Customs,  
Wellington, 21st April, 1898.

W. T. GLASGOW,  
Secretary and Inspector.

## No. 10.

STATEMENT showing the PRICE of GOLD per OUNCE, PRICE charged per Ton for CRUSHING QUARTZ or CEMENT, and PRICES charged for WATER per SLUICE-HEAD per WEEK, during the Year ending 31st March, 1898.

Mining District.	Price of Gold per Ounce.	Price charged per Ton for crushing Quartz or Cement.	Price charged for Water per Sluice-head per Week.	Remarks.
	£ s. d.	£ s. d.	£ s. d.	
AUCKLAND—North Hauraki .. ..	£2 16s. to £3 2s. 6d.	..	..	..
South Hauraki .. ..	£2 14s.	0 5 6	£3 to £4	..
Ohinemuri .. ..	£2 8s. to £3	0 8 0	Nil	..
Te Aroha .. ..	£2 11s. to £3 9s.	0 7 6	Nil	..
Puhipuhi .. ..	..	..	..	..
Tauranga .. ..	No mines crushing	..	..	..
MARLBOROUGH—Pelorus and Wairau ..	3 17 0	..	0 2 6	Private arrangement.
NELSON—Wangapeka .. ..	£3 13s. to £3 15s.	..	..	..
Motueka .. ..	3 14 0	..	..	..
Charleston .. ..	3 19 0	0 1 6	2 5 0	40 in.
Inangahua .. ..	£3 18s. to £4 1s. 10d.	8s. to 10s.	..	..
Collingwood .. ..	3 13 6	..	..	..
Takaka .. ..	3 14 6	..	..	..
Westport .. ..	3 19 0	..	Nil	..
Murchison .. ..	3 17 6	0 10 0	Nil	..
Lyell .. ..	3 17 6	0 10 0	Nil	..
WESTLAND—Hokitika, Kanieri, and				
Waimea .. ..	3 18 0	..	3 0 0	40 in.
Totara and Ross .. ..	3 18 0	0 12 0	1 10 0	40 in.
Stafford .. ..	3 18 0	..	1 10 0	40 in.
Greymouth .. ..	£3 18s. to £3 19s.	..	0 10 0	..
Kumara .. ..	3 18 0	..	2 0 0	20 in. by 2 in. opening.
Ahaura .. ..	£3 18s. to £3 19s.	0 12 0	1 10 0	..
Okarito .. ..	3 18 0	..	..	..
OTAGO—Hindon .. ..	3 17 6	Nil	Nil	..
Tuapeka .. ..	3 18 6	..	3 0 0	..
Longwood .. ..	3 10 6	..	..	..
Preservation .. ..	3 16 6	..	..	..
Orepuki and Roundhill ..	3 16 6	..	..	..
Waiau .. ..	3 14 0	..	..	..
Arrow (Wakatipu Goldfield) and Queenstown	3 15 0	12s. 6d. to 15s.	None let	20 in. by 2 in.
Mount Ida .. ..				
Macrae's, Hyde .. ..	3 17 0	..	1 0 0	Hogburn head, private races.
Hamilton, Serpentine ..			1 10 0	40 in. by 1 in., Government races.
Maerewhenua .. ..	3 17 0	..	1 0 0	20 in. by 2 in., and 4 in. pressure.
Cromwell .. ..	3 17 0	0 8 0	0 4 0	..
Waikaia .. ..	3 14 6	..	1 0 0	..
Tapanui .. ..	3 15 0	..	..	..
Wyndham .. ..	3 16 0	..	..	..
Roxburgh .. ..	3 17 6	1 0 0	(Water used by owners)	..
Clyde and Alexandra ..				
Black's .. ..	3 17 6	1 0 0	Water used by owners	..

**No. 11.**  
**RETURN showing the AVERAGE PRICES of PROVISIONS and LIVE-STOCK for the Year ending 31st March, 1898.**

Mining District.	LIVE-STOCK.				MEAT.				Tobacco.	Wine.													
	Beer.	Brandy.	Bread Wheat.	Butter Fresh.	Butter Salt.	Cheese.	Coffee.	Flour.			Grain Wheat.	Cattle Horned.	Goats.	Horses.	Sheep.	Pine.	Beef.	Mutton.	Pork.	Milk.	Rice.	Salt.	Sugar.
	Per. bhd.	Per gall.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per 100 lb.	Per bushel.	Per head.	Per head.	Per head.	Per head.	Per head.	Per lb.	Per lb.	Per lb.	Per qt.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.
AUCKLAND—																							
South Hauraki ..	90/	27/	d.	1/9	6/	6/	1/10	10/6	4/	3	12/	8-10	15/	40/	d.	d.	d.	d.	d.	d.	d.	d.	6/
Ohinemuri ..	56/	23/	1 1/4	1/2	10/	7/	1/10	10/6	4/6	6	..	7	10/	20/	5	4	6	3	3 1/2	1	3	3	8/
North Hauraki ..	90/	85/	1 1/4	1/10	8/	6/	1/6	12/	3/6	4	20/	3-25	7/	10/	3	3	4	5	3 1/2	1 1/2	1	1	10/
Tauranga ..	104/	36/	1 1/4	1/	10/	4 1/2	2/	18/	4/6	6	..	5	4/6	20/	4	3	3	2 1/2	2 1/2	1	3	3	7/
Te Aroha ..	90/	35/	1 1/4	1/10	8/	6/	1/6	12/	3/6	4	20/	3-25	7/	10/	3	3	4	2 1/2	2 1/2	1	3	3	7/
Pūhupū ..	..	..	1 1/4	1/6-1/10	4/10	6/	1/9	Auckland prices: + 15/ a ton.	..	3-8	..	2-15	5/10	10/40	4-6	2 1/2-5-4-3	2-4	3	3	1	3	3	1 1/4-2/6
MARLBOROUGH—																							
Queen Charlotte Sound	80/	23/	2 1/2	1/	10/	7/	2/	18/	4/6	6	15/	9	8/	25/	5	4	7	3	3 1/2	1 1/2	3 1/2	2/	6/
Pelorus ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wairau ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
NELSON—																							
Wangapeka ..	..	..	7	9/	9/	10/	2/	15/-20/	..	3-5	..	10-30	7/10	10/-60/	3-4	3-4	5	4	4	1-2	4	4	3/
Collingwood ..	93/	25/	2	8/	6/	8/	1/10	13/6	5/	3-4/10/0	..	10-20	7/	15/	3-5	2-4	5	4	3 1/2	1	3	3	6/
Takaka ..	90/	25/	..	7/	7/	7/	1/9	12/	4/	8	..	12	6/	15/	3	2 1/2	3	4	3	1	3	3	6/
Inangahua ..	100/	27/	2	1 1/3	10/	7/	1/9	14/	5/6	7	10/-40/	5-30	10/-15/	20/-60/	5	4	5	5	4	2	3	2/	6/
Lyell ..	105/	26/	2 1/2	1 1/3	1/	7/	1/9	17/	8/	5	..	5-20	9/	10/-80/	4	4	6	6	4	2	3	2/	6/
Murchison ..	120/	25/	1 1/2	1/	1/	8/	2/	16/	8/	5	..	6-18	8/	10/-80/	4	3	5	3	2	2	3	2/	6/
Westport ..	90/	27/	1 1/2	1/2	1/	6/	2/	12/	6/	7	15/	20	16/	40/	5	5	6	5	3	1	3 1/2	2/3	7/6
Charleston ..	120/	26/	4	1/	10/	8/	2/	14/	5/6	1/5-7/15	10/-20/	10/-30/	10/-20/	25/-30/	5	5	6	6	4	2	3	2/3	6/
Ahaura ..	95/	25/	2	1/3	1/	8/	2/	16/	5/	6-9	10/	10-20	12/-15/	50/-70/	5	5	8	6	4	2	4	2/-3/	7/
WESTLAND—																							
Stafford ..	110/	28/	2	1/6	1/3	1/	1/3	15/	6/6	5-10	5/-20/	5-30	15/-20/	15/-80/	6	6	6	6	4	2	4	3/	6/6
Waimea ..	80/	25/	2	1/	1/11	6/	1/8	15/	4/8	7	..	6-20	10/	60/-90/	5	5	6	6	2 1/2	1	2 1/2	2/	5/6
Hokitika and Kanieri ..	110/	24/6	2	1/	1/	8/	1/6-2/	15/	6/	6-7	5/	10-20	12/-16/	40/-60/	7	6	8	4	4	2	3	2/-2/6	6/
Ross ..	120/	40/	2	1/3	1/	9/	2/	18/	6/	7/10/0	..	8-20	12/-16/	40/-60/	5-6	4	8	6	4	2	4	2/-3/	7/
Okarito ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kumara ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Grey mouth ..	90/	25/	1 1/2	1/-1/31/-1/3	1/3	8/	1/9-2/	11/6	4/6	7/10/0	..	..	7/6-19/	10/-60/	4-6	2 1/2-5	6	4	3	1 1/2	3	1 1/6-2/	5/8
OTAGO—																							
Hindon ..	..	..	2	1/	10/	7/	1/9	12/	4/6	3-86	..	5-30	3/-12/	..	5	3	5	4	5 1/2	1	3 1/2	2/	5/6
Tuapeka ..	90/	26/	1 1/2	8/-10/	8/	6/	1/10	9/	3/6	5	..	7-18	7/-13/	20/-50/	6	3	6	3	3	1	3	2/	5/6
Tapanui ..	90/	24/	1 1/2	1/	9/	6/	2/	9/	2/-4/	2-10	..	2-20	2/6-14/	10/-60/	7	6	8	4	4	2	3	2/-2/6	6/
Cromwell ..	100/	27/	2	1/	10/	8/	1/9	13/	4/6	3	..	9	9/	40/	4 1/2	4	6	6	3 1/2	2 1/2	3 1/2	2/3	5/6
Clyde ..	120/	28/	1 1/2	1/	1/	7/	1/9	13/	5/	3-7	..	3-25	3/-15/	45/	5	4	8	5	2 1/2	1 1/2	3	2/	5/-7/
Alexandra ..	110/	27/	1 1/2	1/	1/	7/	1/6	12/	4/6	4-7	..	2-20	4/-12/	40/	5	4	7	5	2	1	3	2/	6/
Roxburgh ..	120/	28/	1 1/2	1/	1/	7/	1/6	13/	4/9	3-7	..	5-25	4/-14/	50/	5	4	7	5	2 1/2	1 1/2	3	2/	6/
Black's ..	110/	28/	2	1/4	1/	9/	2/	14/	4/4	5-10	..	10-30	3/-15/	20/-100/	6	5	6	6	3	2	4	2/-3/	18/
Queensdown ..	103/	28/	1 1/2	1/	7/	6/	1/10	13/3	5/6	5	..	26	11/	50/	4	2 1/2	3 1/2	3	3	1	3	2/	5/6
Wyndham ..	120/	30/	2	1/3	1/	9/	2/	14/	4/4	5-10	..	10-30	3/-15/	20/-100/	6	5	6	6	3	2	4	2/-3/	18/
Arrow (Wakatipu Goldfield)	90 to 140/	24/6	2	1/3-1/4	1/	6/-9/	2/	12/ to 14/6	4/8-5/	4-5	..	8-25	5/-8/6	30/-50/	4-6	3-5	6	4	3-4	2	3-4	1/6-2/	16/-30/
Mount Ida ..	..	..	1 1/2	1/	10/	8/	2/	20/	2/-4/	1-10	..	2-20	7/6-14/	10/-60/	6	4	6	3	3	1 1/2	3 1/2	1/10-2/6	25/-30/
Nenthor ..	90/	24/	1 1/2	1/	9/	8/	2/	8/6	2/	0-9	20/	8-18	5/-12/	20/-35/	5	4	6	3	2	1	3 1/2	1/6-2/3	18/
Waikata ..	90/	27/	1 1/2	10/	10/	6/	2/	20/	4/	8-10	..	15	6/-8/	30/	4	3	8 1/2	8	3	1 1/2	3	2/	5/
Orepuki and Longwood ..	..	..	1 1/2	9/	9/	8/	2/	14/	3/9	9/10/0	..	..	..	..	..	..	..	..	..	..	..	..	..
Maerewhenua ..	..	..	1 1/2	9/	9/	8/	2/	14/	3/9	9/10/0	..	..	..	..	..	..	..	..	..	..	..	..	..

**No. 12.**  
**TABLE showing the AVERAGE RATE of WAGES per WEEK for the Year ending 31st March, 1898.**

Mining District.	General Managers.	Legal Managers.	Mining Managers.	Engineers.	Engine-drivers.	Stokers.	Blacksmiths.	Carpenters.	Miners.	Labourers.	Boys.	Chinese.	Agricultural Labourers.	Domestic Servants.
<b>AUCKLAND—</b>														
North Hauraki	£ s. d. £500 to £1000	£ s. d. £1 to £2	£ s. d. £3 to £5	£ s. d. £3 to £3 10	£ s. d. 2 14 0	£ s. d. 2 8 0	£ s. d. 2 8 0	£ s. d. 3 0 0	£ s. d. 2 5 0	£ s. d. 1 10 0	£ s. d. 10/ to 15/	£ s. d. ..	£ s. d. 1 10 0	5/ to 10/
South Hauraki	10 0 0	£1 to £2	3 0 0	3 0 0	3 0 0	2 2 0	2 10 0	3 0 0	2 8 0	2 2 0	1 0 0	..	1 10 0	10/
Te Aroha	..	£1 to £2	4 0 0	3 0 0	3 0 0	1 16 0	3 0 0	3 0 0	2 8 0	1 16 0	..	..	..	..
Puhipuhi	..	£1 to £2	4 0 0	3 0 0	3 0 0	2 8 0	2 8 0	3 0 0	2 8 0	2 2 0	1 10 0	..	1 0 0	5/ to 10/
Ohinemuri	..	£1 to £2	£4 to £6	£4 to £5	3 0 0	2 8 0	2 8 0	3 0 0	2 8 0	1 16 0	0 15 0	..	1 0 0	7/6 to 10/
Tauranga	..	0 10 0	2 10 0	..	..	..	2 8 0	2 8 0	2 2 0	..	..	..	..	..
<b>MARLBOROUGH—</b>														
Wairau	..	2 0 0	8 10 0	2 14 0	..	2 8 0	2 14 0	2 14 0	2 8 0	2 2 0	..	..	1 16 0	10/
Pelorus	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<b>NELSON—</b>														
Collingwood	5 0 0	1 10 0	5 0 0	3 10 0	2 10 0	2 0 0	2 14 0	2 14 0	2 8 0	2 0 0	0 12 0	..	1 0 0	10/
Takaka	..	£1 to £3	£4 to £10	4 0 0	3 10 0	1 16 0	£3 10 to £4	3 10 0	£2 17 to £3	£2 8 to £3	5/ to 10/ found	..	1 0 0	7/
Inangahua	..	..	..	..	3 10 0	3 10 0	3 0 0	3 12 0	2 10 0	2 10 0	£1 16 to £2 8	..	25/ and found	10/ to 15/
Charleston	..	0 10 0	4 0 0	..	3 0 0	2 8 0	3 0 0	3 12 0	2 14 0	2 8 0	15/ and found	..	20/ and found	10/ and found
Westport	..	4 0 0	5 0 0	4 0 0	3 10 0	..	3 10 0	3 10 0	3 0 0	2 8 0	2 8 0	..	15/ and found	15/ and found
Lytell	..	4 0 0	6 0 0	4 0 0	3 10 0	..	3 10 0	3 10 0	3 0 0	£1 10 to £2	2 8 0	..	15/ and found	5/ to £1 found
Ahaura	10 0 0	3 0 0	5 0 0	4 0 0	3 0 0	3 0 0	3 0 0	3 0 0	2 10 0	£1 10 to £2	2 8 0	..	1 10 0	7/ to 10/
Murchison	..	..	3 10 0	3 0 0	3 0 0	2 8 0	3 0 0	3 0 0	2 8 0	2 8 0	2 0 0	..	20/ and found	12/ and found
Wangapeka	..	..	..	..	..	..	9/ a day	8/ a day	8/ a day	6/ a day	4/ to 6/ a day	..	6/ a day	6/ to 10/
<b>WESTLAND—</b>														
Wainaea and Stafford	..	4 0 0	3 10 0	3 10 0	3 0 0	..	8 0 0	3 10 0	2 10 0	2 10 0	1 0 0	1 10 0	2 0 0	£1
Hokitika and Kanieri	4 0 0	1 0 0	£4 to £5	4 0 0	3 0 0	..	..	3 12 0	3 0 0	2 10 0	1 0 0	£1 10 to £2	1 0 0	8/ to 15/
Ross	..	1 5 0	5 0 0	..	..	..	4 0 0	8 12 0	3 0 0	2 10 0	1 10 0	..	..	8/
Kumara	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Greymouth	..	1 0 0	£4 to £6	£4 to £5	3 0 0	2 5 0	£3 to £3 10	10/ to 14/ day	£2 10 to £3	7/ to 9/ a day	10/ to 12/	20/-30/ found	£1 to £2 found	6/ to 12/6
Okarito	..	..	..	..	..	..	..	3 12 0	8 0 0	2 8 0	..	..	30/ and found	10/
<b>OTAGO—</b>														
Hindon	5 0 0	..	3 10 0	3 3 0	3 0 0	..	3 15 0	..	2 8 0	2 2 0	..	..	1 0 0	..
Tuapeka	4 0 0	2 0 0	3 10 0	£4 to £5	2 10 0	2 5 0	2 14 0	2 14 0	2 2 0	2 0 0	0 10 0	1 0 0	1 0 0	10/
Tapanui	..	..	..	..	..	..	3 0 0	3 0 0	2 8 0	1 16 0	0 10 0	15/ to £1	15/ to £1	9/ to 14/
Cromwell	5 0 0	0 10 0	4 0 0	3 10 0	3 0 0	2 10 0	2 10 0	3 0 0	2 8 0	2 0 0	1 5 0	1 0 0	£1 and found	9/
Clyde	4 0 0	15/ to £1	3 10 0	2 15 0	2 10 0	..	3 0 0	3 0 0	£2 8 to £3	2 8 0	0 15 0	1 0 0	£1 and found	7/ to 15/
Alexandra	..	..	..	..	..	..	3 0 0	3 0 0	£2 8 to £3	2 8 0	0 15 0	1 0 0	£1 and found	7/ to 15/
Black's	4 0 0	15/ to £1	3 10 0	2 15 0	2 10 0	..	3 0 0	3 0 0	£2 8 to £3	2 8 0	0 15 0	1 0 0	£1 and found	7/ to 15/
Roxburgh	4 0 0	15/ to £1	3 10 0	2 15 0	2 10 0	..	3 0 0	3 0 0	£2 8 to £3	2 8 0	0 15 0	1 0 0	£1 and found	7/ to 15/
Waikaka	..	4 0 0	3 10 0	4 0 0	3 0 0	..	3 0 0	2 10 0	2 8 0	2 2 0	0 12 0	0 15 0	1 0 0	8/ to 10/
Orepuki and Longwood	5 0 0	£40 per ann.	3 0 0	3 0 0	2 15 0	2 8 0	2 14 0	3 0 0	2 2 0	1 16 0	0 15 0	1 10 0	2 2 0	8/ to 10/
Arrow	5 0 0	1 0 0	5 0 0	4 0 0	3 0 0	2 10 0	3 0 0	4 0 0	3 0 0	2 8 0	10/ to £1	£1 to £1 10	£1 to £1 5	10/ to 12/
Queenstown	5 0 0	1 0 0	5 0 0	4 0 0	3 0 0	2 10 0	3 0 0	4 0 0	3 0 0	2 8 0	10/ to £1	£1 to £1 5	£1 to £1 5	10/ to 12/
Mount Ida	6 0 0	£30 to £50 yr.	£3 10 to £4	£3 to £3 10	..	2 8 0	£2 10 to £3	4 0 0	2 10 0	2 2 0	1 0 0	..	15/ to 25/ keep	8/ to 10/
Meerewhenua	..	..	3 0 0	..	..	..	2 14 0	2 14 0	£2 2 to £2 8	1 16 0	0 12 0	..	15/ to 25/ keep	6/ to 10/
Wyndham	..	..	..	..	..	..	10/ a day	9/ a day	8/ a day	7/ a day	0 12 0	..	6/ a day	6/ to 10/

## No. 13.

NUMBER of MACHINES employed in ALLUVIAL and QUARTZ-MINING, and the VALUE thereof, for the Year ending 31st March, 1898.

Mining District.	Machinery employed in Alluvial Mining.													Machinery employed in Quartz-mining.										Apparatus Value of all Mining Plant included in the Return.	
	Steam-engines employed winding, crushing, &c.		Puddling-machines.	Whims.	Whips or Pulleys.	Sluices, Toms, and Sluice-boxes.	Water-wheels.	Hydraulic Hose.	Pumps.	Dredges.	Quicksilver and Compound Cradles.	Derricks.	Stamp-heads crushing Cement.	Boring-machines.	Steam-engines employed winding, crushing, &c.		Crushing-machines.	Stamp-heads.	Water-wheels.	Whims.	Whips or Pulleys.	Derricks.	Bordans.		
	No.	Aggregate h.p.													No.	Aggregate h.p.									
AUCKLAND—																									
Ohinemuri ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	1,627	13	474	14	..	1	..	..	182,000	
North Hauraki ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	115	1	..	..	1	51	45,000	
South Hauraki ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22	435	2	405	20	..	..	..	63	74,100	
Te Aroha ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	150	1	10	2	..	..	..	..	3,000	
Puhipuhi ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	
Tauranga ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Totals ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	48	2,212	22	1,004	38	..	1	2	114	309,100	
MARLBOROUGH—																									
Wakamarina ..	..	1	10	..	1	28	..	7	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	2,100	
Cullen's Creek ..	..	..	..	1	..	5	1	1	1	..	..	2	..	..	..	..	1	10	1	1	..	..	..	700	
Waikakaho ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6,500	
Other places ..	..	..	..	1	..	13	..	5	..	..	..	..	..	..	1	15	..	..	..	..	..	..	..	4,300	
Totals ..	..	1	10	..	2	46	1	13	2	1	..	3	..	..	1	15	1	10	1	1	..	..	..	13,700	
NELSON—																									
Wangapeka ..	..	..	..	..	..	144	..	1	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,000	
Collingwood ..	..	..	..	1	1	145	..	7	1	1	..	2	..	..	1	45	3	40	..	..	..	..	..	20,800	
Takaka ..	..	..	..	..	..	20	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10,000	
Inangahua ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	26	733	22	380	20	2	3	..	65	179,300	
Charleston ..	..	..	..	..	..	40	5	..	..	..	..	..	20	..	..	..	..	..	..	..	..	..	..	60,000	
Lyell ..	..	..	..	..	..	62	..	3	..	1	..	..	..	..	..	..	2	30	2	..	..	..	..	11,000	
Murchison ..	..	..	..	..	..	700	1	5	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	13,000	
Westport ..	..	..	..	..	..	54	2	24	..	..	..	..	22	..	..	..	3	25	3	..	..	..	..	6,500	
Ahaura ..	..	..	..	8	..	2,309	4	630	1	2	..	..	23	..	..	..	1	10	1	..	..	..	..	20,000	
Totals ..	..	..	..	9	1	3,474	12	672	8	6	..	2	65	..	27	778	31	485	26	2	3	..	65	251,500	
WESTLAND—																									
Stafford ..	..	..	..	2	5	2,000	4	600	5	..	9	..	..	..	..	..	..	18	3	..	..	..	..	10,000	
Ross ..	..	..	..	..	..	60	3	40	..	2	..	..	..	..	..	..	3	..	..	..	..	..	..	14,000	
Hokitika and Kanieri ..	..	..	..	..	2	80	1	100	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	2,500	
Greymouth ..	..	2	39	..	..	1,380	2	530	30	..	35	..	..	..	..	..	2	6	2	..	..	..	..	12,225	
Kumara ..	..	..	..	..	..	150	2	90	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,000	
Okarito ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Totals ..	..	2	39	..	2	3,670	12	1,360	36	3	44	..	..	..	..	..	5	19	5	..	..	..	2	41,725	
OTAGO—																									
Tapanui ..	..	..	..	..	..	25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	130	
Hindon ..	..	..	..	..	..	15	2	2	..	..	..	..	..	..	5	38	4	31	2	..	..	..	..	8,000	
Tuapeka ..	..	..	..	..	..	560	13	18	35	12	..	..	..	..	..	..	3	35	2	..	..	..	..	40,000	
Cromwell ..	..	4	49	..	..	..	..	5	..	10	1	..	..	..	3	23	7	34	1	..	..	..	..	39,000	
Clyde and Alexandra ..	..	1	2	..	3	1	455	383 mls.	3	16	..	1	..	1	..	..	3	14	1	2	1	..	..	60,000	
Roxburgh ..	..	..	..	1	1	740	2	114	4	16	..	..	..	..	..	..	..	..	..	..	..	..	..	78,000	
Black's ..	..	..	..	1	1	600	18	..	2	1	..	..	..	..	..	..	1	7	1	1	..	..	..	33,000	
Orepuki & Longwood ..	..	6	90	..	..	200	..	5	..	..	..	..	..	..	4	32	4	20	2	..	..	..	..	1,100	
Waikaka (Switzer's) ..	..	..	..	..	..	500	1	5	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	8,000	
Arrow ..	..	..	..	..	..	250	..	50	5	..	..	..	..	..	..	..	4	40	3	..	..	..	..	25,000	
Queenstown ..	..	..	..	..	..	400	..	50	2	3	..	..	..	..	..	..	5	75	..	..	..	..	..	40,000	
Naseby ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Kyeburn and Clarke's ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hamilton's and Sowburn ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hyde and Fullerton's ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Macrae's, Strath-Taieri, and Shag Valley ..	..	..	..	2	2	700	4	600	..	2	..	1	1	1	2	60	5	70	2	1	2	1	2	25,000	
Serpentine ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
St. Bathans's, Ida Valley, &c. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Maerewhenua ..	..	..	..	..	..	140	..	30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	840	
Wyndham ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Totals ..	..	11	141	1	7	5	4,585	26	765	51	63	1	2	1	2	14	153	36	326	14	4	3	1	2	358,070

## SUMMARY.

Auckland ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	48	2,212	22	1,004	38	..	1	2	114	309,110
Marlborough ..	..	1	10	..	2	1	46	1	19	2	1	..	3	..	..	1	15	1	10	1	1	..	..	..	13,788
Nelson ..	..	..	..	..	9	1	3,474	12	672	8	6	..	2	65	..	27	778	31	485	26	2	3	..	65	251,587
Westland ..	..	2	39	..	2	7	3,670	121	360	36	3	44	..	..	..	..	5	19	5	..	..	..	2	..	41,725
Otago ..	..	11	141	1	7	5	4,585	26	765	51	63	1	2	1	2	14	153	36	326	14	4	3	1	2	358,070
Totals	..	14	190	1	20	14	11,775	512	810	97	73	45	7	66	2	90	3,158	95	1,844	84	7	7	3	183	974,980

## No. 14.

TABLE showing approximately the NUMBER, DESCRIPTION, and VALUE of the WATER-RACES, TAIL-RACES, DAMS, RESERVOIRS, and GROUND-SLUICES in Operation during the Year ending 31st March, 1898.

Mining District.	Water-races.				Tail-races.		Dams.		Reservoirs.		Ground-slucies.		Approximate Total Cost.
	No.	Length in Miles.	No. of Sluice-heads.	Approximate Cost.	No.	Approximate Cost.	No.	Approximate Cost.	No.	Approximate Cost.	No.	Approximate Cost.	
<b>AUCKLAND—</b>				£		£		£		£		£	£
Hauraki North ..	6	3	14	460	2	50	4	590	2	25	..	..	1,065
Hauraki South ..	18	24	153	57,586	6	340	71	770	2	5,000	..	..	63,696
Te Aroha ..	1	2	10	8,000	..	..	..	..	..	..	..	..	3,000
Puhipuhi ..	2	1	1 to 3	250	..	..	..	..	..	..	..	..	250
Ohinemuri ..	14	18½	99	14,550	1	1,000	7	3,000	..	..	..	..	18,500
Totals ..	41	47½	279	75,846	9	1,390	82	4,300	4	5,025	..	..	86,511
<b>MARLBOROUGH—</b>													
Pelorus ..	38	58	82	6,977	11	655	4	145	4	105	..	..	7,882
<b>NELSON—</b>													
Wangapeka, Baton, and Sherry ..	12	12½	124	10,650	6	651	4	50	..	..	1	50	11,401
Collingwood ..	49	61	431	99,876	52	6,450	49	9,110	..	..	..	..	115,436
Inangahua ..	406	335½	3,296	186,259	516	30,540	573	23,147	..	..	..	..	189,946
Charleston ..	132	146½	1,016	17,957	228	22,420	283	8,830	..	..	69	345	49,552
Westport ..	218	200	1,638	42,341	181	25,787	372	16,000	..	..	..	..	84,128
Lyell ..	46	51	95	7,000	10	400	13	1,000	..	..	..	..	8,400
Murchison ..	120	98	420	18,000	48	1,500	45	1,100	..	..	..	..	20,600
Ahaura ..	750	856	3,100	160,000	850	70,100	650	18,600	..	..	..	..	248,700
Motueka ..	5	4	15	1,000	1	60	5	70	..	..	..	..	1,130
Takaka ..	13	7	38	276	11	400	20	300	..	..	..	..	976
Totals ..	1,751	1,771½	10,173	493,359	1,903	158,308	2,013	78,207	..	..	70	395	730,269
<b>WESTLAND—</b>													
Hokitika & Kanieri ..	288	224	610	220,000	300	3,500	308	2,900	..	..	..	..	226,400
Ross ..	142	120	530	55,780	167	1,800	73	1,927	..	..	50	620	60,127
Kamara ..	190	103	380	24,500	185	14,000	70	5,000	11	7,000	40	800	51,300
Greymouth ..	350	330	1,180	86,000	760	17,500	970	13,000	..	..	..	..	116,500
Okarito ..	23	16½	203	730	17	210	15	220	..	..	..	..	1,160
Stafford ..	700	300	1,600	17,000	700	8,000	550	7,000	50	3,000	600	3,000	38,000
Totals ..	1,693	1,083½	4,503	404,010	2,129	45,010	1,981	30,047	61	10,000	690	4,420	493,487
<b>OTAGO—</b>													
Hindon ..	71	115	701	35,380	21	380	17	1,500	..	..	20	125	37,385
Tuapeka ..	312	895	1,810	16,800	435	9,500	310	7,000	..	..	..	..	33,300
Tapanui ..	5	8½	10	130	3	30	2	80	..	..	..	..	190
Clyde & Alexandra ..	253	595	757	29,350	165	10,650	105	8,500	1	..	..	..	48,500
Black's ..	126	478	545	37,500	112	7,200	81	7,400	..	..	..	..	52,100
Arrow ..	90	175	225	14,000	125	4,500	25	1,400	25	..	..	..	19,900
Roxburgh ..	175	365	1,115	30,720	87	6,300	69	3,950	1	3,000	..	..	43,970
Cromwell ..	465	1,287	1,760	86,662	267	12,990	159	11,130	..	..	..	..	110,782
Waikaia ..	139	390	850	34,000	170	2,300	127	2,090	..	..	24	2,060	40,350
Orepuki and Longwood ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Queenstown ..	120	200	600	65,000	150	5,000	40	1,700	30	..	..	..	71,700
Naseby ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyeburn & Clarke's ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hamilton's and Sowburn ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hyde & Fullerton's ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Macrae's, Strath-Taieri, and Shag Valley ..	572	1,535	2,300	..	309	..	125	..	..	..	..	..	..
Serpentine ..	..	..	..	..	..	..	..	..	..	..	..	..	..
St. Bathans and Ida Valley ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wyndham ..	14	17	66	1,960	..	..	..	..	..	..	..	..	1,960
Totals ..	1,845	6,060½	10,639	351,502	1,844	58,750	1,060	44,700	57	3,000	44	2,185	460,137

## SUMMARY.

Auckland ..	41	47½	279	75,846	9	1,390	82	4,300	4	5,025	..	..	86,511
Marlborough ..	38	58	82	6,977	11	655	4	145	4	105	..	..	7,882
Nelson ..	1,751	1,771½	10,173	493,359	1,903	158,308	2,013	78,207	..	..	70	395	730,269
Westland ..	1,693	1,083½	4,503	404,010	2,129	45,010	1,981	30,047	61	10,000	690	4,420	493,487
Otago ..	1,845	6,060½	10,639	351,502	1,844	58,750	1,060	44,700	57	3,000	44	2,185	460,137
Totals ..	5,368	7,020½	25,676	1,331,694	5,896	264,113	5,140	157,399	126	18,130	804	7,000	1,778,286

## No. 15.

RETURN of CASES in the WARDENS' COURTS, and COSTS AWARDED, for the Year ending 31st March, 1898.

Mining District.	Number of Mining Disputes adjudicated on.	Aggregate Amount of Value.		Amount of Costs awarded.	Cases wherein Judgment has been given in favour of the Plaintiff.
		Claimed.	Recovered.		
<b>AUCKLAND—</b>		£ s. d.	£ s. d.	£ s. d.	
North Hauraki .. .. .	475	3,119 2 11	2,235 16 0	236 17 0	..
South Hauraki .. .. .	234	3,385 7 0	2,368 5 9	280 13 10	3
Te Aroha .. .. .	13	70 0 0	70 0 0	8 15 0	..
Puhipuhi .. .. .	..	..	..	..	..
Ohinemuri .. .. .	269	8,233 9 6	4,098 11 1	245 15 0	11
<b>MARLBOROUGH .. .. .</b>	171	..	..	7 11 0	2
<b>NELSON—</b>					
Collingwood .. .. .	16	129 3 11	56 15 2	21 13 6	5
Inangahua .. .. .	59	3,838 17 0	808 17 0	85 14 4	..
Lyell .. .. .	6	40 0 0	..	10 1 0	..
Westport .. .. .	41	599 8 0	8 8 0	55 7 6	3
Charleston .. .. .	6	43 0 0	2 8 0	13 10 0	2
Ahaura .. .. .	12	67 11 6	56 9 8	9 12 11	..
Murchison .. .. .	..	..	..	..	..
<b>WESTLAND—</b>					
Kumara .. .. .	17	150 0 0	28 0 0	40 8 6	..
Greymouth .. .. .	41	..	..	39 15 0	..
Hokitika and Kanieri .. .. .	7	48 6 7	38 16 7	12 12 0	..
Stafford .. .. .	18	50 0 0	0 1 0	4 4 0	..
Ross .. .. .	4	267 10 0	17 10 0	7 15 0	..
Okarito .. .. .	1	20 0 0	..	..	..
Goldsborough .. .. .	9	..	..	24 7 0	..
<b>OTAGO—</b>					
Tapanui .. .. .	..	..	..	..	..
Hindon .. .. .	1	64 0 0	..	2 2 0	..
Tuapeka .. .. .	20	28 0 0	1 0 0	72 14 9	..
Cromwell .. .. .	47	70 0 0	50 1 0	28 10 6	..
Roxburgh .. .. .	13	67 18 6	60 7 0	8 10 0	..
Black's .. .. .	9	..	..	3 0 0	..
Clyde and Alexandra .. .. .	20	816 0 0	31 11 0	63 17 6	..
Waikaia .. .. .	15	50 0 0	..	16 10 0	..
Orepuki and Longwood .. .. .	39	531 0 0	493 12 0	110 8 0	..
Arrow (Wakatipu Goldfield) .. .. .	8	..	..	6 5 0	..
Queenstown .. .. .	9	258 5 9	258 5 9	72 2 0	..
Mount Ida .. .. .	31	213 0 0	159 6 9	30 0 0	..
Maerewhenua .. .. .	6	5 0 0	..	18 7 0	..
Wyndham .. .. .	..	..	..	..	..
<b>Totals .. .. .</b>	1,617	22,165 0 8	10,844 1 9	1,486 19 4	26

## No. 16.

RETURN of the NUMBER of MINING LEASES or LICENSES and AGRICULTURAL LEASES in Force on the 31st March, 1898, the EXTENT of GROUND LEASED or held under LICENSE, and RENTAL per ANNUM.

Mining Leases.					Agricultural Leases.				
Mining District.	No.	Gross Acreage.		Rental per Annum.	No.	Gross Acreage.		Rental per Annum.	
<b>AUCKLAND—</b>		A.	R. P.	£ s. d.		A.	R. P.	£ s. d.	
Hauraki North .. .. .	253	14,771	0 15	2,709 9 0	38	1,515	1 0	..	
Hauraki South .. .. .	360	24,304	1 14	7,759 12 0	..	..	..	..	
Te Aroha .. .. .	41	2,773	0 3	1,113 6 0	1	100	0 0	1 5 0	
Puhipuhi .. .. .	5	496	0 0	124 0 0	..	..	..	..	
Ohinemuri .. .. .	385	28,624	0 88	18,437 3 0	16	744	0 0	..	
Tauranga .. .. .	26	2,183	1 23	1,094 0 0	..	..	..	..	
<b>MARLBOROUGH—</b>									
Wairau and Pelorus .. .. .	32	1,522	1 3	398 2 9	..	..	..	..	
<b>NELSON—</b>									
Collingwood .. .. .	1	10	0 0	10 0 0	..	..	..	..	
Inangahua .. .. .	182	9,646	1 20	4,382 18 6	..	..	..	..	
Charleston .. .. .	19	667	2 1	267 5 0	5	143	3 8	3 13 6	
Ahaura .. .. .	48	3,576	1 38	1,763 0 0	4	116	3 5	5 19 0	
Westport .. .. .	..	..	..	..	..	..	..	..	
Lyell .. .. .	..	..	..	..	..	..	..	..	
Murchison .. .. .	..	..	..	..	..	..	..	..	
Owen's .. .. .	..	..	..	..	..	..	..	..	
<b>WESTLAND—</b>									
Okarito .. .. .	..	..	..	..	1	50	0 0	1 17 6	
Hokitika and Kanieri .. .. .	13	947	3 35	370 0 0	6	242	0 3	14 16 0	
Kumara .. .. .	20	235	1 9	167 18 0	3	58	1 3	6 0 0	
Stafford .. .. .	9	323	0 0	109 10 0	..	..	..	..	
Greymouth .. .. .	44	1,786	2 15	643 10 0	..	..	..	..	
Ross .. .. .	16	834	0 0	417 0 0	..	..	..	..	
<b>OTAGO—</b>									
Waikaia .. .. .	..	..	..	..	3	71	3 5	7 8 0	
Cromwell .. .. .	..	..	..	..	5	323	2 0	24 12 9	
Hindon .. .. .	46	1,650	0 0	736 7 6	5	299	0 0	15 11 3	
Tuapeka .. .. .	69	3,168	1 6	1,541 15 0	40	492	0 0	41 5 0	
Black's .. .. .	15	488	0 0	213 10 0	10	115	0 0	6 16 0	
Clyde and Alexandra .. .. .	64	3,047	0 0	1,002 0 0	13	498	0 0	44 12 6	
Roxburgh .. .. .	37	1,553	0 0	656 0 0	59	1,186	0 0	76 2 6	
Naseby .. .. .	71	2,513	3 39	953 7 6	29	1,357	2 35	65 12 0	
Arrow (Wakatipu Goldfield) .. .. .	..	..	..	..	21	734	3 23	38 11 6	
Queenstown .. .. .	..	..	..	..	26	379	1 8	16 3 6	
Maerewhenua .. .. .	1	30	0 12	15 10 0	33	1,164	0 0	45 12 8	
Tapanui .. .. .	..	..	..	..	..	..	..	..	
Wyndham .. .. .	..	..	..	..	..	..	..	..	
<b>Totals</b> .. .. .	<b>1,757</b>	<b>105,006</b>	<b>3 31</b>	<b>44,885 4 3</b>	<b>318</b>	<b>9,591</b>	<b>1 10</b>	<b>415 18 8</b>	

H. J. H. ELLIOTT,  
Under-Secretary for Mines.

*Approximate Cost of Paper.*—Preparation, not given; printing (3,750 copies), £75 18s. 6d.

By Authority: JOHN MACKAY, Government Printer, Wellington.—1898.

Price, 1s 6d.]





1898.  
NEW ZEALAND.

---

# INSPECTION OF COAL-MINES REPORT.

*Presented to both Houses of the General Assembly by Command of His Excellency.*

---

## No. 1.

Mr. GEORGE WILSON, Inspecting Engineer, to the UNDER-SECRETARY for MINES.

SIR,— Mines Department, Wellington, 25th May, 1898.

I have the honour to forward you covering report on the progress of the coal-mining industry for the year ended the 31st December, 1897.

The output of coal from the mines throughout the colony for the past year amounted to 840,713 tons, being an increase on the previous year of 47,862 tons. The output comprised 504,764 tons of bituminous coal, 34,969 tons of pitch-coal, 268,020 tons of brown coal, and 32,960 tons of lignite.

Mining operations were carried on in 153 mines, in connection with which 1,912 men were employed, the average output being 439 tons per man per annum. Four fatal accidents occurred during the year, but they were all due to misfortune and not to negligence. The Act and regulations are strictly adhered to in most of the mines.

I have, &c.,

GEO. WILSON,  
Inspecting Engineer.

The Under-Secretary, Mines Department, Wellington.

## No. 2.

Mr. JAMES COUTTS, Inspector of Mines, to the UNDER-SECRETARY for MINES.

SIR,— Inspector of Mines' Office, Thames, 4th May, 1898.

I have the honour, in compliance with section 67 of "The Coal-mines Act, 1891," to report as follows on the coal-mines in Provincial District of Auckland for the year ending the 31st December, 1897 :—

### NGUNGURU.

*Kiripaka Colliery.*—This mine has been continuously worked during the year, employing forty-four men in and about the mine. The seam of coal has varied from 2 ft. 10 in. to 10 ft. in thickness, and, as a number of the men have been employed on the thin part of the seam, the output of coal has been considerably decreased. Air-shafts are sunk from the side of the hill as the workings proceed, and the ventilation is good. There is always plenty of timber on hand for the miners' use, and every attention is paid to their safety. The output of coal for the year was 16,248 tons, being a decrease of 3,985 tons as compared with the previous year. No accidents reported from the mine during the year.

### WHANGAREI.

*Kamo New Mine.*—The work in this mine has been limited, the operations being confined to working out small blocks of coal that were near the surface, left by the previous company. The ventilation was good and the mine safe. The output of coal was 1,037 tons, an increase of 164 tons over the previous year. Five men were employed. No accidents.

### HIKURANGI.

*West Bryan's Mine.*—There has been very little work done in this mine for the last eight months, operations being limited to prospecting and boring for coal. The output of coal for the year was 2,142 tons, a decrease of 7,397 tons as compared with the previous year.

*Hikurangi Coal Company's Mine.*—This mine has been very successfully worked during the year, having produced 30,663 tons, being an increase of 2,683 tons over the previous year. The mine is well opened up, and everything in connection with it is carried out in a systematic manner. The levels and bords are carried along narrow, and large pillars are left; consequently, very little timber is required to keep the workings secure. The ventilation was good and workings safe on my last inspection of the mine, and no accidents of any kind were reported to me during the year.

1—C. 3B.

*Hikurangi Collieries (Limited).*—The operations in this company's mine have been chiefly confined to working the seam of coal on the outcrop. The surface covering on the coal varied from 1 ft. to 6 ft. in thickness; consequently, most of the coal up to the end of December has been quarried out. This is a new mine, and is well situated, being close to the railway; therefore the prospects of the company may be considered encouraging, as no doubt the quality of the coal will improve to the dip. No accidents.

*Phoenix Coal Company.*—This mine has been continuously worked, and a large number of men were employed for a short time, but, as the price of coal delivered into the trucks was so low that it did not pay the company, the number of men was reduced. The workings are carried on from an adit-level, which is securely timbered and safe. The ventilation is also good. No accidents reported from the mine. The output of coal for the year was 5,026 tons, an increase of 2,926 tons over the previous year.

#### WAIKATO.

*Waikato Colliery Company's Mine.*—This mine has been steadily worked during the year. The operations in the mine have been confined to taking out pillars, and the manager has exercised great care for the safety of the men in taking out the coal, and a very small percentage of the coal has been lost. Abundance of timber is kept at the mine ready for immediate use. The output of coal for the year was 13,317 tons, a decrease of 916 tons as compared with the previous year. Four slight accidents happened in the mine, but none of a serious character.

*Taupiri Extended Company's Mine.*—This mine has been worked continuously during the year. The works in the early part of the year were confined to what are termed the east and west districts at No. 1 level, but the manager is directing the operations now in opening the mine at the dip or No. 2 level, near No. 2 shaft. The levels are being vigorously pushed ahead, so that no time may be lost in opening up this portion of the mine, and, as the coal is of good quality at the dip, the prospects of the company look very encouraging. The output of coal for the year was 33,066 tons and 847 tons slack, an increase of 4,925 tons over the previous year. The ventilation is all that could be desired, and the mine is safe. Two accidents happened in the mine: one was of a slight character; but the other, due to a fall of coal, proved fatal to a miner named William Crowder, but no blame could be attached to any one.

*The Taupiri Reserve.*—This mine is being steadily worked, and a fair amount of coal is being produced. The workings in the mine are still confined to that part of the property under Lake Kimihia, but the principal works are directed from the new dip extension. Large pillars are left to keep the mine secure, and from 5 ft. to 8 ft. of tops are left on in the places to strengthen the roof. The output of coal for the year was 18,870 tons, an increase of 210 tons over the previous year. The ventilation is good, and the workings, to all appearance, safe; but, strange to say, no less than ten accidents were reported, most of them being of a slight nature.

#### KAWAKAWA.

*New Bay of Islands Coal Company.*—This company's operations have been mostly confined to working out pillars of coal near the outcrop, and sinking prospecting shafts for the purpose of discovering any patches of coal that might have been considered by the previous company not good enough to work. In this the company have not been successful, as in most cases the seam of coal cut through by these shafts was too thin to work. Great care has been exercised in working out the pillars, and it has required a large quantity of timber to keep the men safe, owing to the coal they have been working being near the surface. The prospects of the company do not look as encouraging as could be desired. Still, the mine was considered exhausted some years ago. Since then a considerable quantity of coal has been produced from it, and it has given employment to a number of men. If prospecting operations are continued in this locality a coal discovery may be met with which would be the means of giving an impetus to the whole of this district. The output of coal for the year was 11,134 tons, a decrease of 2,833 tons as compared with the previous year. An accident of a serious nature happened in this mine to a miner named Emerson Lee, from which he is not likely to recover. He was in the act of drawing out timber when it occurred, but no blame could be attached to any one.

#### MOKAU.

*Mokau Coal-mines Syndicate (Limited).*—The opening-up of this mine is being more vigorously pushed ahead. An air-drive has been put in from the side of the hill and a connection made with the workings, which has given excellent ventilation. The seam of coal is 7 ft. in thickness, and the band of shale in the centre of the seam, which has been 2 ft. thick in places, is gradually getting thinner as the workings are proceeding into the hill, and the coal to all appearance is improving. There has been great difficulty in getting the coal taken away and shipped in the past, but a steam-launch has now been put on to tow the barges down the river, and the s.s. "Kiripaka," capable of carrying 120 tons, has been put on to take the coal from the Heads. The output of coal for the year was 3,148 tons, an increase of 1,205 tons over the previous year. No accidents are reported.

*Bombay Mine.*—The work in this mine has been very limited, and the mine has only been worked to supply the settlers in the neighbourhood. Twenty-five tons was taken out during the year, an increase of 7 tons over the previous year. No accidents.

#### ACCIDENTS.

A fatal accident happened to a miner named William Crowder, in the Taupiri Extended Company's mine, and one of a serious nature to Emerson Lee, in the Bay of Islands Coal-mine; also minor accidents occurred.

## REMARKS.

The output of coal for the year shows a slight increase (1,473 tons) over that of the previous year. There is abundance of coal which can be worked in the Auckland District at a small cost, and a much greater output could be maintained if necessary.

I have, &c.,

JAMES COUTTS,

Inspector of Mines.

The Under-Secretary for Mines, Wellington.

## No. 3.

Mr. ROBERT TENNENT, Inspector of Mines, Westport, to the UNDER-SECRETARY for MINES.

SIR,—

Inspector of Mines' Office, Westport, 20th April, 1898.

I have the honour, in compliance with section 67 of "The Coal-mines Act, 1891," to report as follows on the West Coast coal-mines for the year ending the 31st December, 1897:—

*Puponga Coal-mine, Collingwood.*—The interest in this lease held by James Walker has been purchased by Joseph Taylor (co-partner), and necessary operations outside the mine are being pushed on, as he intends to put coal on the market for the coming winter.

*Pakawau Coal-mine.*—(2/11/97): This mine is situated seven miles from Collingwood, and is owned and worked by William Caldwell, who employs two men. During the year work has been chiefly confined to opening out a fresh section on the west side, and an easterly tunnel has been driven in the coal 150 ft., and is connected with an uprise to the surface which provides good air. This coal is much superior in quality to that obtained from the old mine, and is conveyed to the loading-hopper over a substantial tramway 17 chains in length. The west level, which extends to the surface, is retimbered, and in good repair. Air on both faces is good. Timber is plentiful, and freely used. Reports daily kept.

*Enner Glynn Coal-mine, Nelson.*—(14/10/97): The coal on face of south-west level is pinched out 260 ft. from winding-shaft, and a further extension of 40 ft. is driven, following the vein, but with unsuccessful results. The coal is chiefly worked by stoping, employing four men. Before commencing work an examination of the mine is made with a safety-lamp, and daily reports are kept. Timbering is well attended to, and is well set. At my request, the bottom section of upcast shaft has been furnished with ladders, and a 3 in. partition-wall newly completed. Good air is provided.

*Mokihinui Coal-mine.*—(2/7/97): Work has been suspended since December, 1896. The charge of the mine is intrusted to John Lenehan, whose duties are to attend to and keep the pumps in working-order, make daily inspections of the mine and report accordingly. The dip haulage-road and back incline form the two entrances, and provide every facility for natural ventilation. Notwithstanding the soft nature of the pavement and long suspension of work, the roads and airways are in fairly good condition, and on each of my visits the air was good. The timber stands well. I found gas in a hole of the roof at bottom bord. This was easily removed, and has since remained clear. Three visits were made.

*Cardiff Colliery.*—(15/9/97): This mine has been steadily worked, and the output over the preceding year has increased 13,849 tons. The chief seat of mining operations is extended from the termination of main haulage-road, and the coal won from this district is of superior quality. The roof requires careful timbering, but this work is strictly attended to, and a plentiful supply of timber is always at hand. Brattice on west level required to be carried forward on working-face, which was done at once. Twenty miners are employed on day-shift and ten after noon. The level section of solid workings which runs between the two main faults still continues in good coal, and it is safe and in good working-order. The pillars worked from the outcrop on No. 1 incline are very satisfactorily removed, and, as great care has to be exercised for the safety of the miner, every precaution is taken. A sandstone roof covers the coal, and is easily timbered. By the erection of a 7 ft. diameter fan of the Schiele type the ventilation is very much improved, and a current of air of 22,000 cubic feet per minute circulates the workings. The haulage plant has been completely renewed, and important extensions carried forward on the workings. I drew Mr. Broome's attention to the heavy timber in entrance tunnel to mine, and on a later visit this timber was thoroughly overhauled, and a number of new sets put in. This part of the road is now in good repair. No gas reported. Manager's and foreman's reports daily recorded. Rules posted. William Cain, a hooker-on at the termination of haulage-rope, was injured by a runaway truck which was let loose by the breakage of a chain-clip. His injuries were not serious.

*Granity Creek Colliery.*—The development works of this new and extensive colliery are completed, and mining operations during the year have been carried on very successfully. A steady current of air, measuring 16,000 cubic feet, travels the workings, and is well led up to the faces. The mine throughout is safe and in good order. Timber is freely used, and spragging is strictly observed. Return airways and working-places were tested by alcohol-flame lamp (Stokes' patent), but no trace of gas could be detected. The coal is principally worked on the rise or western side from main haulage-road, and this district is divided into twenty-four working-places, employing forty-seven miners. A prospecting heading, to prove the field towards Mine Creek, is being pushed ahead night and day. Four coal-cutting machines of the percussion type, actuated by compressed air, hole the coal in the eastern or Dip section on the afternoon shift, and it is afterwards blasted down by authorised officers during the night, when the coal is left ready for the fillers. The results from these coal-cutting machines, and the suitable application of compressed air for working underground machinery, have been so far satisfactory that the management has added a duplicate air-compressing engine to their plant, built by George Leyner, engineer, Denver, Colorado. The incline tramway, over which the coal is conveyed to the screening- and loading-banks, situated on the Government

railway, is a mile and a quarter in length, and falls from the mine-mouth a vertical height of 1,200 ft. The tramway is worked by two separate sections of endless haulage, and the travel of the ropes is regulated by powerful hydraulic machinery, built by A. and T. Burt, engineers, Dunedin. The ropes are made of plough-steel,  $4\frac{1}{2}$  in. and  $3\frac{1}{2}$  in. respectively, and the tubs are attached "by ones," with chain-clips either on front or back, as required. All the viaducts over the deep ravines on this tramway are being securely fenced. The leading features in carrying out the construction of these works are strength and durability, and they reflect great credit on the management. The provisions of the Act are strictly carried out.

*Coalbrookdale Colliery.*—(12/8/97): This group of mines has been steadily worked during the year. The Cascade west section is the principal centre of solid workings, which extend over a large and valuable area of clean coal. The thickness of the seam varies from 6 ft. to 30 ft. The average height of the workings is 9 ft. The remaining portion of the coal forms a good roof. It is well timbered, and consequently a very safe working is made. To provide a better ventilation system an extensive scheme is being carried out, with the object of splitting the main air-current and providing separate return airways to each district of the workings direct to the fan. A large quantity of stonework has had to be cut, the execution of this work incurring considerable expense. The work will be completed in a few weeks, and a general improvement in the ventilation is anticipated. The air volume at fan is 28,000 cubic feet. A deviation of the main haulage-road to a more central position of the workings is being driven, and to form a connection 3 chains of stonework yet remains to be cut. Solid work on the east side of Cascade Mine is finished, where one electric coal-cutting machine of the percussion type is employed at pillar-work. The bad nature of the roof requires careful timbering. Big Dip: Pillar-work at the bottom of haulage-road and Martin King's heading is exhausted. The miners are removed, and are employed on a higher level of pillars. The roof over this coal is a loose fireclay, and special care on the part of the miner is required. Pumping is still continued. New Mine: The coal-seam in this mine averages 7 ft. thick, with a strong sandstone roof, which provides natural advantages favourable for coal-cutting machinery. Two electric percussion machines are constantly employed, and satisfactory results are obtained. Close attention is paid to timbering as the coal is removed, and the whole pillar is extracted before a fall takes place. No timber is drawn. Air good; natural ventilation. Muncie's Mine: Work was suspended for a short time, but on my last visit preparations were being pushed on to open out a large district of pillars, and six men were employed putting up timber and railing new roads. This section connects with New Mine, and is ventilated by one continuous current: a dip-drive to form a connection and provide a permanent travelling road with Cascade Mine. Apart from haulage traffic, this work will be completed in about two months. No accidents are reported from this group of mines. The Act and all reports are strictly kept.

*Ironbridge Colliery.*—(13/8/97): The output from this mine depends chiefly on the Cedar seam, where thirty-four miners are employed. The workings are well regulated, and are extended by two parallel winning headings, which are driven by two shifts. Brattice is led well forward on the face, and the general ventilation is good. To provide a direct ventilating current, and cut off all return airways, a heading is being driven in advance of the workings towards Cedar Creek, where the fan will be built. This seam promises favourably for coal-cutting machinery, and preparations for this work are well forward. A new electric cable is laid, and four new machines of the percussion type are on the works. In the Gentle Annie three miners are employed single-handed, picking out a few stoops that remain. A shaly formation forms the roof, but timbers well. The shaft district is abandoned, and all movable plant is removed. The flat seam is 18 ft. thick, covered with a strong grit sandstone, and the removal of these pillars are taken the full thickness with little loss of coal. Air good, and timber plentiful. James Hamilton, miner, had his knee-cap and ankle broken by a fall of coal rolling on his leg.

*Langford Coal-mine.*—(18/8/97): This coal-seam varies in thickness from 1 ft. 9 in. to 2 ft. 3 in.; rises, 1 in 3. It is worked long-wall, and has a good roof. The opened ground is filled with *débris* from surface shafts on the outcrop, and from these shafts good air is kept on the working-face. Timber is regular, and carefully set. Buller dredge is supplied with this coal.

*Whitecliffs Coal-mine.*—(20/9/97): This mine is owned by Job Lines, and at time of visit work had ceased.

*Flaxbush Coal-mine.*—(21/8/97): Work at this mine has also ceased. Owner, Mr. De Philippi.

*Coal Creek Coal-mine.*—(20/9/97): This mine is worked from an outcrop on the south bank of the Buller River, near Whitecliffs. Mr. Hansen has recently taken up the lease for the supply of the Excelsior dredge, Three-channel Flat. The coal is of good quality, and well suited for steaming purposes. I requested that three sets of timber be placed at mine-mouth, which was done at once.

*Golden Treasure Coal-mine.*—(20/8/97): This lease has been formerly worked bord and pillar. John Davidson, the present owner, has two men employed sluicing off the surface and breaking out the coal opencast. A small percentage of gold is collected from the wash.

*Bayfield Coal-mine.*—(20/8/97): This adjoining lease of old workings, connecting the Golden Treasure, is held by James Sara. The coal is also worked opencast, the surface being stripped off by sluicing.

*Phoenix Coal-mine.*—(20/8/97): Owing to the loose way this mine had been worked, a creep was brought on the workings; consequently the tunnel was lost by a landslip from the hillside. Operations were resumed from a tunnel on the west side of the terrace, where the drays are now loaded. On a later visit the mine had settled down, and the workings were in good order. Upcast shaft supplies good air.

*Breen's Coal-mine.*—(10/2/98): This coal-seam stands nearly on edge. The workings are opencast along the line of outcrop. A small drive was cut into the terrace a few feet, following the coal. Globe Mine is supplied with this coal.

*Beckford Coal-mine.*—This is a thin seam 2 ft. thick, worked by tunnelling. The surface is very thin over the coal; chiefly sandstone.

*Lankey's Gully Coal-mine.*—(20/8/97): This mine is worked by Mr. Lamberton and one youth. The workings are chiefly from the Rise level, where the coal is harder and of better quality. The bords being driven narrow, with a coal roof, little timber is required, and the workings are safe.

*Inkerman Coal-mine.*—(10/2/98): The Inkerman Gold-mining Company employ two miners to supply coal for their rock-drill machinery at the low-level tunnel on Rainy Creek. The coal is worked from a dip-drive.

*Waitakere Coal-mine.*—(20/10/97): The thickness of this lignite seam is unknown, but 10 ft. is worked opencast, from which the residents of Charleston are supplied with a good house coal.

*Blackball Colliery.*—(30/7/97): Work was resumed after repairs were completed on aerial tramway, and operations have since continued. The principal workings are westerly from the main tunnel. They are divided by parallel levels into three sections, which form, in the aggregate, eighteen working-places, employing thirty-six miners. A layer of fireclay overlies the coal, which forms a bad roof, and more than ordinary care is necessary, as close-lathed timber is required in nearly every place. Timbering receives special attention, and good roads are kept. A circulating current of air, 15,000 cubic feet per minute, travels the workings. The cliff has been holed by a second heading, where a ventilating furnace is built. The upcast shaft, together with all exposed coal-surfaces, is lined with brick, and strong currents of air sweep the intervening passages, with the object of preventing spontaneous combustion. Work on the east side of the mine is confined to four working-places, employing eight miners. A wagon-driver named John Ryan, who was employed on the railway-siding, received a compound fracture of the skull by the tail-chain unhooking from its fastening.

*Brunner Colliery.*—(31/8/97): The output from this mine is chiefly confined to the extraction of pillars from the dip-workings. This mine is exclusively worked by lead rivet locked safety-lamps of the Marsaut type, and blasting operations are carried out by authorised officers at night after the ordinary day's work is over. In July, owing to continuous heavy rains percolating through the roof, pumping and baling were overpowered, and in consequence the bottom sections were abandoned, and allowed to fill up with water. The pillars being nearly finished at the time, little coal was lost. Pending this stoppage the middle sections were in readiness, and the miners were removed and employed without delay. The ventilation is carried on by splitting, and each district is supplied by separate currents of fresh air, the average volume measuring 16,000 cubic feet per minute. On each of my visits careful examinations were made, and the return airways tested with an alcohol-flame lamp, which showed no trace of gas. On the 20th December, 1897, I found gas on face of east level and over a large fall, but this gas was removed by ventilation at once. Stoppings, airways, and falls are daily examined and reported, and readings of the ventilation weekly recorded. Application was lodged by Robert Alison, general manager, for permission to remove a coal barrier left during the formation of the dip-workings by the late management, with the object to guard against water from the rise. After due consideration, the Hon. the Minister of Mines granted permission for its removal. David Dunbar, miner, had his hand crushed against the roof by his truck getting derailed, which resulted in the amputation of a finger.

*Brunner Rise Mine.*—(1/9/97): Working operations are continued by two shifts, employing 103 men underground, the total output being produced from the removal of pillars. From the bottom or west level back to No. 2 incline, extending along the line of thinning, the pillars are exhausted, and the men are removed to No. 1 incline. This thinning of the Brunner seam extends from the extreme dip of the field, and has been followed until it intersected the eastern boundary, which forms the cliff, thus cutting off all solid coal. A second outlet near the rise has been holed to the cliff, and a current of 10,000 cubic feet per minute travels the workings. (20/12/97): Work is chiefly confined from both sides of No. 1 incline. The coal is removed very successfully, and without loss. The only difficulty experienced is to get the roof to fall, although the timber is drawn regularly as the coal is taken out. The coal averages from 5 ft. to 6 ft., and, with steady work, a large area is soon exhausted. Workings and roads are kept in good repair. No gas reported. Manager and foreman report daily. Timber plentiful. No accidents reported.

*Coal Creek, Point Elizabeth.*—Work done on this lease has been chiefly of a prospecting character. Various outcrops have been opened out, and two bore-holes put down. The first bore-hole pierced a coal 15 ft. thick, at a depth of 144 ft. The second bore-hole passed through the same seam 9 ft. 6 in. thick, at a depth of 381 ft.

#### ACCIDENTS.

22nd July.—Blackball: A wagon-driver named John Ryan, employed on the railway-siding, received a compound fracture of the skull by the tail-chain unhooking from its fastening.

2nd October.—Brunner: A miner named David Dunbar had a finger amputated, his hand being crushed against the roof by his truck getting derailed.

3rd December.—Ironbridge: James Hamilton, a miner, had his knee-cap and ankle broken by a fall of coal rolling on his leg.

The provisions of the Act are carried out throughout this district.

#### GENERAL REMARKS.

No fatal accidents occurred during the year, and the ratio of minor accidents shows a decrease.

Naked lights are in use throughout the district with the exception of the Brunner old mine, and for coal-blasting the common explosive used is compressed powder. Clay tamping is provided and placed at convenient stations in the mines, and shot-firing is strictly carried out by authorised officers after working-hours, the workings being of a damp nature.

*Accident Fund.*—The amounts credited at the Post-Office Savings-Bank on the 1st January, 1898, to the various companies are as follows: Westport Coal Company, £1,424 9s. 11d.; Westport-Cardiff, £44 9s. 2d.; Greymouth-Point Elizabeth, £136 9s.; Blackball Coal Company, £180 11s. 1d.; total, £1,785 19s. 2d.

*Foreign Trade.*—During the year 1897 the Westport Coal Company shipped 16,701 tons of coal to ports outside of New Zealand. This is an increase of 6,154 tons over the previous year's shipments.

The output for the year shows an increase of 25,960 tons over the preceding year, the total output being 430,960 tons.

I have, &c.,

R. TENNENT,

Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

#### No. 4.

Mr. JOHN HAYES, Acting Inspector of Mines, Dunedin, to the UNDER-SECRETARY for MINES.

SIR,—

Office of Inspector of Mines (Southern District), Dunedin, 30th March, 1898.

In accordance with the requirements of section 67 of "Coal-mines Act, 1891," I have the honour to report on the mines visited since taking duty in April last as follows:—

*Springfield Colliery, Springfield* (The Springfield Coal- and Pottery-works Company, owners).—(10/8/97): The top seam is not now being worked. All coal comes from a lower seam, raised at a small new shaft at the pottery-works. The section is as follows: Coaly clay roof; top coal, 2 ft. 6 in.; parting, 4 in.; bottom coal, 9 in.; fireclay, say, about 4 ft. thick. The workings are in very good order, and timbering is carefully done. Ventilation is quite satisfactory. Report-books kept up to date. A copy of the mine plan has been sent in since my visit. The whole of the clay and most of the coals raised at this mine are used at the brick- and pottery-works belonging to the same proprietors.

*Canterbury Colliery, Sheffield* (Austin Brothers, owners).—(10/8/97): Nine men are employed here, seven of whom are engaged in getting coal, the present output being about 14 tons per day. The mineral is carted to Sheffield Railway-station, about a mile and a quarter. If the proprietors had a light branch line to their pit no doubt a larger trade could be done. The seam, which lies with a dip of 1 in 3, yields 4 ft. of coal, and has a thick parting, which is utilised for stowing (packing) the spaces between the roadways. The method of working here adopted insures little or no waste. Natural ventilation is relied on, and appears ample. I suggested an improvement in the method of distributing the air, which is necessary in the summer months. No copies of rules posted. Report-books and plans behind. Drew attention to provisions of the Act relating to these matters.

*Hornbush Colliery, Glentunnel* (J. Deans, owner; T. Brown, manager).—(11/8/97): The coal here is 7 ft. 6 in. thick, with a shaly sandy-clay roof overlaid by thin coal. At the adit-level the dip is 1 in 3, but towards the outcrop it gets much steeper—say, 1 in 1½. This pit has been laid out on a good plan, and it will be possible to take out the remaining pillars with practically no loss of coal. The roof is fairly strong, the roadways of ample area and in good order, and the ventilation excellent. There is a good road (forming a main return airway) to the second outlet, and I strongly recommended the manager to keep this secure by leaving plenty of pillar coal for its support when taking out the main body of the pillars. There are seven men engaged getting coal. Report-books up to date. Survey made a few days prior to my visit. Copy of Act at mine-entrance.

*St. Helen's Mine, Whitecliffs* (H. Levick, owner).—(13/8/97): The pit, until recently worked by Mr. Levick, is now stopped, and the owner has taken up ground at which the Whitecliffs Coal Company formerly worked. A new tunnel has been driven intersecting two seams. Mr. Levick intends continuing this tunnel until the other seams in the series are cut. Very little coal-getting has been done in this tunnel as yet. No copies of general and special rules posted up. Report-book properly kept. Mr. Levick has had his workings recently surveyed. The pit is in very satisfactory order.

*Hartley Mine, Whitecliffs* (W. Leeming and Sons, owners).—(13/8/97): Leeming's old drive is now stopped, the coal at which he was working being practically exhausted. Another tunnel has been started at a grade of 1 in 3. When driven about a chain the seam was struck, and found to have a dip of 1 in 6. It is at this date 48 yards from the mouth, and when extended to 60 yards a connection is to be made with the air-shaft formerly used in conjunction with the old tunnel. A Tangye steam-pump is to be shortly put in position.

*Wairiri Mine, Glenroy* (Wairiri Coal Company, Limited, Christchurch, owners; A. Thompson, mine-manager).—(12/8/97): The old Glenroy Mine is owned by this company, but has been standing for about a year. A new mine has recently been started by an adit-tunnel (from the banks of the Wairiri Creek) driven across the overlying measures for 3½ chains, at which distance the coal is struck. An air-shaft has been sunk near the outcrop, and a connection established. Good ventilation has been thereby secured. The main headings on each side of the tunnel are now being driven, but are not far in. Thickness of seam, 6 ft., with two dirt partings, which reduce the thickness of marketable coal to 5 ft. 6 in. This mine is about six miles from a railway. Sales will consequently be local for the most part.

*Mount Somers* (G. Park, owner).—(17/8/97): This pit is about eight miles and a half from Mount Somers Railway-station, and near the south branch of the Ashburton River. The seam is upwards of 30 ft. thick, with a dip of about 1 in 8, and crops out in a creek. It is ordinarily quarried, the surface being sluiced off, for which purpose water is brought from the creek by 11 in. diameter iron pipes under a head of 60 ft. Owing to the recent scarcity of water, underground mining has been resorted to temporarily. It is Mr. Park's intention to utilise water for sluicing



when it is available, and strip as large an area as possible, so as to be able to quarry the coal for some years. One acre of stripping will expose, say, 30,000 tons of saleable coal. A few days prior to my visit a young man named Harris sustained slight injury to his foot when working at the coal. My inquiry satisfied me that the cause was purely accidental.

*Albury Coal-mine, Albury* (W. Young, lessee).—(14/9/97): The seam here is 22 ft. thick, and lies at an angle of 45 degrees. The coal is raised up a shaft (68 ft. deep) by horse-power. The men enter and leave the mine by an incline. Ventilation and general condition of the place are fair. The old workings are not fenced off. No report-books kept. Drew attention to these matters, which the lessee promised would be attended to.

*Brockley Tunnel*.—(12/8/97): The Brockley Coal Company (Limited) is now in liquidation, and all work stopped, but it is possible the following information may be of interest: The coals in the district are ordinary brown coals, and the overlying measures appear to correspond. At Brockley they appear to have been violently disturbed, and are found nearly vertical, while on the adjoining property of the Wairiri Coal Company the inclination is about 1 in 3 or 1 in 4. At the former place there has been a flow of dolerite, which now overlies the coal-beds. This covering, when in a molten state, has had the effect of practically distilling the hydrous and volatile constituents of the coal-seams and their associated strata, and the upper seam (which was nearest to the flow of dolerite) has been altered into anthracite coal, or what is practically equivalent to it, and the laminated shale overlying the seam has been correspondingly altered into what may be termed a coarse graphite. In similar manner the clay underlying the coal has been baked like pottery-ware, and coals lower in the geological series, and consequently further away from the heat of the dolerite flow, have been altered to a lesser extent, but sufficient, at all events, to bring them up to the standard of Newcastle (New South Wales) coals. It is said that the outcrop of these Brockley seams can be traced for three or four miles at least. The tunnel (which has been driven through the dolerite) is 8 chains or 9 chains in length, and, although very wet and in bad order, I went in as far as possible and saw the coals. The anthracite seam is about 3 ft. 6 in. thick, and other seams are cut, including the well-known Brockley bed, which is about 4 ft. thick. A wooden tramway a mile and a half long connects the tunnel with the county road, but until the railway is extended from Whitecliffs there does not appear much hope of this mine being able to do a large trade. I was informed that a syndicate contemplate working for local consumption, and in so doing exploit the area of coal which can be won. There appears no question as to the excellence of quality for locomotive and marine use, but the quantity of coal available has not yet been reliably approximated.

*Kurow* (D. Scott, lessee).—(17/9/97): Entrance to this mine is by adit. The coal is almost vertical. Its general width or thickness is about 15 ft., of which 7 ft. are worked. The present level is some 30 ft. below that formerly worked, and as yet no proper return airway is provided, but Mr. Scott states he will shortly sink a little shaft for ventilation. The present state of the air is not at all bad. Very little timber is used or required. Drew attention to the requirements of the Act as regards keeping report-books, &c.

*Kurow* (W. B. Cairns, owner).—(17/9/97): This pit is on the bank of the Awakino River, and is entered by a dip-drive cut in the coal-seam from the outcrop. Inclination of seam, about 1 in 2½. The coal is bagged underground and raised by horse-power. Pumping is done by water-wheel power. Only one working-place. Coal is very strong. By cutting the roof (in the coal) arch-shape very little timber is required. No copies of rules posted, nor report-book kept. Wrote owner calling attention to requirements of Act.

*Wharekuri, near Kurow*.—(17/9/97): The coal here is practically vertical. None of the pits are now working, but Mr. D. Sutherland is driving a tunnel to open out a new pit. He has not yet struck the coal.

*St. Andrews Coal-mine, Papakaio* (Thomas Nimmo, owner).—(16/9/97): The seam here is about 8 ft. thick, with a dip of 1 in 4, and the coal fairly hard. The pillars are being extracted from the rise-workings. This pit was a pleasure to inspect. Everything was found executed in a good workmanlike fashion. Timbering is not much required, but where done it is a credit to the owner. Capital ventilation is maintained, and the second outlet is quite equal to the main entrance. Regulations are carefully attended to.

*Prince Alfred Mine, Papakaio* (John Willetts, owner).—(16/9/97): This pit is entered from two distinct places, by an adit-level in each case, both adits being connected with the workings, and forming escape outlets as well as haulage and airways. The main roadway is rather thickly timbered, and some ten or twelve sets need renewing: directed attention to this. The coal is of variable thickness (9 ft. to 13 ft.), and intersected with soft patches. Excellent ventilation is maintained, but I cannot say much for the system, or want of system, in which the pit has been laid out and worked. On returning to Dunedin I wrote the owner as to the posting of rules, keeping report-books and plans.

*Ngapara* (William Nimmo, owner).—(18/9/97): Found this pit in very nice order; air good, report-books and plan up to date, rules posted, &c. The seam is a strong thick lignite, and needs very little timber. Demand is limited to the requirements of the locality.

*Shag Point Colliery, Shag Point* (Thomas Shore, manager).—(3/6/97): Accompanied by Mr. T. Shore, I inspected all the workings. These are principally in No. 5 seam, which is from 2 ft. 6 in. to 3 ft. thick. The coal (which is worked on the long-wall system) is of very superior quality. Roadways and working-places all in good order, and ventilation satisfactory. No. 4 seam is much thicker, but the coal is rather stony, and only two or three places are working in it, the coal being used for steam purposes. A bore-hole is being put down on the beach, just above high-water mark, at a point 24 chains to the south of the shaft, with the object of proving the coal behind a downthrow fault which runs obliquely across the present rise-workings at an angle of about N. 70 W. (magnetic). A 2 ft. seam was passed through at 233 ft. At present in



gritty sandstone ; depth, 400 ft. (7/7/97) : Mr. Shore informed me the bore-hole was stopped at 416 ft. by running sand and water in very large quantities.

*Allandale Colliery, near Shag Point* (Allandale Coal Company, Limited, owners).—(3/6/97) : The workings in this colliery are from an incline tunnel dipping in the opposite direction to the stratification of the measures. The seam is broken up to some extent by small faults. Good ventilation is maintained, and the places generally are in good order. The present return airway is rather small and very rough in places, but, as a new tunnel has recently been driven to win an area of coal to the dip of the present workings, and a heading is now being cut which will connect the workings of both tunnels in the course of a week or two, there is no need to incur expense in putting the return airway into better order, as it will answer all reasonable requirements for the length of time it is required. When the connection is made, all the coal will be jigged to the new drive, and hauled there to the surface. The present main working-drive will then become the upcast and second outlet, for which purpose it is admirably adapted. The new drive is 960 ft. long, with a grade of 1 in 5, and is afterwards driven level for 385 ft. Size, 10 ft. by 6 ft. The seam where struck is dipping about 1 in 2½. It is intersected by small faults, and has a varying thickness up to 6 ft.

*Fernhill Mine, Abbotsford* (James Gray, lessee).—(21/9/97) : On inspecting this mine I found the ventilation very sluggish, and several places sealed off on account of fires ; also one or two places heating. The Dunedin Corporation's Silverstream water-race crosses the workings, and the lessee alleges that water percolates from this race through the strata into the mine-workings. Certainly I found water dripping in several places, its effect being to damp the slack and coaly refuse in the mine. This has a decided tendency to induce spontaneous combustion in the coal-mines of this locality. Mr. Gray further fears that, unless the Corporation siphon the race for a few chains, it may ultimately break through and flood the mine. He is consequently afraid of opening out the coal to the dip until steps are taken to secure the stability of the water-race. (25/10/97) : I again visited the mine, in company with Mr. S. H. Mirams, city engineer, and with Mr. Gray we went through the underground workings and along the water-race. Mr. Gray appears to make out a good case, although liability is disclaimed by Mr. Mirams.

*Abbotsford Colliery* (Freeman's Coal Company ; E. R. Green, manager).—(21/7/97) : Accompanied by Mr. Green, I inspected the whole of the workings in progress, return airways, &c., and found everything in reasonably good order, and the ventilation very satisfactory. All the present workings are in solid ground. The pillar-workings (which took fire) are sealed off by good brick stoppings, with a length of substantial brick arching in the engine-plane. Fire-stink is thus effectively kept back from present workings. The main return air-course is rather small, but a new road is being cut to the roadway adjacent to the upcast shaft. This will be used as a pipe-road in connection with a new compound duplex pump about to be put down, and will serve as a main return airway also. On the completion of this new road it is intended to enlarge the present roadway near the upcast. At present the ventilating-power is obtained from the heat generated by steam-pipes in the shaft and the exhaust steam from the Tangye pump, but when this is displaced by the new pump, fan or furnace ventilation will be necessary. The coal is intersected by a few faults. These cause the dip to be somewhat variable. Plans, report-books, &c., well up to date, and Act generally well observed.

*Walton Park Colliery, Fairfield*.—(6/8/97) : The Walton Park Coal and Pottery Company (Limited) having ceased operations, the mine now belongs to Mr. Patterson, and is worked by Messrs. Pollock and Gray as lessees. I found twenty persons employed below ground, coal-getting being principally by splitting pillars in the rise-workings. The dip-workings are full of water, and the middle workings sealed off on account of fire. The ventilation was good, and averaged 324 cubic feet of air per minute per person employed. Pumping is being effected by means of the old bucket-pumps attached to the winding-engine, and till quite recently was assisted by a Tangye duplex pump. This latter has not been satisfactory, and is temporarily replaced by a duplex pump (specially designed for a Southland mine), while the makers (Messrs. Johnston and Sons, engineers, Invercargill) are constructing a larger pump of similar design, capable of dealing with the entire water-flow of the mine. (29/9/97) : I again visited the mine, the lessees having informed me that a creep was taking place near the shaft. I found the auxiliary pumping plant had been drawn to the surface, and that the water had risen a few feet up the shaft. I also learned that a couple of joints had sprung in the large steam-boiler from which the duplex pump took its steam, necessitating the insertion of a new plate. From an examination of the shaft down to the water, and from what I learned from the lessees as to the condition of things underground near the shaft-bottom, together with a careful perusal of the daily report-book, I very much question the wisdom of attempting to take the water out of the shaft, seeing that most of the available coal above the shaft-level can be taken out by means of an existing tunnel. (4/10/97) : Mr. Pollock, one of the lessees, wrote me that the proprietor of the mine had resumed possession as from that date, and that the writer had ceased to act as mine-manager. The proprietor's representative called on me a day or two afterwards, and informed me of their intention to take the water out of the shaft by winding. Pending the appointment of a manager, Mr. James Lowden (a certificated manager) assumed temporary charge. Mr. John Kenyon was subsequently appointed manager, and took up his duties about the 14th October. On the 17th October a serious breakdown occurred to the winding plant, by which considerable damage was done, and the old bucket-pump was thereon set to work. On the following day the enginewright, on going down the back pit (pump compartment) to effect repairs to the pump pipes, fell into the water, and was drowned (see "Accidents"). In subsequent conversation with the manager and proprietor, I strongly deprecated any further attempts to take the water out of the shaft, but recommended them to work all available coal from the tunnel-entrance. This was decided on, and on my further inspecting the mine on the 24th November a site was chosen to re-erect the large steam-boiler and sink a small

shaft (for steam- and water-pipes) near the tunnel. This work was completed about the end of the year, and the new pump set to work. During November and December the ground close to and for a considerable distance from the shaft cracked to the surface, and proved the wisdom of the course adopted for the future working of the mine. The new pump, which is specially designed and built for mining work, is giving every satisfaction.

*Saddle Hill Mine, Saddle Hill* (Christie Brothers).—(3/12/97): The coal worked by Messrs. Christie is from 19 ft. to 25 ft. thick. A new dip-tunnel is being constructed, which, when completed, will cut off a long length of haulage both above and below ground. The workings are in very nice order, and no fault could be found with the ventilation.

*Burnweil Pit, Saddle Hill* (A. Harris).—(3/12/97): The seam here is from 9 ft. to 23 ft. thick, with a somewhat variable dip. Six persons are employed. The places are in good order, and the air ample and sweet. Mr. Harris proposes starting a new adit at a much lower level from an adjoining gully, in order to command a larger area of coal than his present entrance gives.

*Glenochiel Pit, Saddle Hill* (Bryce Brothers).—(3/12/97): The owners have recently completed a new drive into their seam. It is 100 ft. long till coal is reached at full working height, then continued in coal to the dip. At the face the seam looks well. Towards the south some patchy and inferior coal is met with. It is proposed to prove whether good coal comes in behind or not. An area of 58 acres is held; 10 acres considered to be coal-bearing. The seam is thick, roads, &c., in good order, and ventilation very satisfactory.

*Lauriston Colliery, Brighton* (J. Walker and Sons).—(24/11/97): The coal appears to lie in a basin. It has a thickness of 9 ft., with a maximum dip of 1 in 13. Haulage and pumping is done by horse-power. Places are in good order, and well ventilated.

*McCull's Pit, Brighton* (D. L. McCull).—(24/11/97): McCull is now working a seam 3 ft. thick which overlies the one previously worked by him, some 3 ft. to 4 ft. of strata separating the two. The workings are of very limited extent, and in fair order.

*Mosgiel Coal-mine* (Nicoll and Sneddon).—(3/11/97): The old drive is now discontinued. A new drive has been driven for some 6 chains down in the coal, which dips 1 in 8. This new dip is well constructed and supplied with man-holes. The workings appear in excellent order, and the ventilation good. A new portable engine is used for hauling and pumping.

*Burnweil Colliery, Lovell's Flat* (Gibson and Lees, proprietors).—(20/5/97): This colliery is now being opened out, and is connected by a branch line to the Government railways at Lovell's Flat. The shaft is 465 ft. deep, and the seam 16 ft. 4 in. thick. Below this there are clay and stone for 2 ft. 3 in., then 4 ft. 6 in. of coal. Dip, 1 in 5. A second shaft is sunk to the seam, but it will take some little time before the connection between the two shafts can be completed, owing to the distance which has yet to be driven. In the meantime the winding-shaft (which is divided) answers for both upcast and downcast. Ventilation is very fair. A bore-hole to prove the existence of lower seams is being undertaken. I found it necessary to draw the attention of the proprietors to certain provisions in "The Coal-mines Act, 1891," in connection with the working of the mine, and was afterwards personally assured by one of the firm that requirements would be complied with. A plan of the workings has been supplied.

*Kaitangata Colliery, Kaitangata*.—(25/6/97): Accompanied by Mr. W. M. Shore, I inspected the workings throughout, entering the mine by the dip engine-plane and leaving it by the winding-shaft. I also travelled the return air-course as far as the ventilating furnace at the bottom of the upcast shaft. On the south side of the engine-plane the pillars in Nos. 2 and 3 sections are being taken out. Very little coal is being lost, comparatively speaking. Across No. 3 fault the coal is much steeper, its dip being 26 degrees from the horizontal, and a fairly large district is being opened out. On the whole, the ventilation was satisfactory. I found a little firedamp in a heading which had been driven to prove No. 3 fault, but the place had been properly fenced off, and a fireboard erected at the entrance. A heading now being driven will shortly establish a connection with that in which gas was found, and clear it. The workings in connection with the vertical shaft are also in good condition, and well ventilated. The coal in this section is very much steeper than in any other part of the colliery. On the north side, in the direction of the Castle Hill property, the coal is not so good, being of a stony nature, and divided by several clay partings. The report-books are kept up to date, and the Act appears to be well observed. (23/11/97): I again visited the colliery, in consequence of an accident by which two men were injured, and examined the workings down the incline. The heading referred to as containing a little gas on my previous visit had been connected, and a very nice current of air was travelling. The various places were found in good order, and the ventilation generally good. Another downthrow fault (east) has been met, and the main coal-seam cut by a tunnel from the 18 ft. seam (Stone Drive section). It was giving off both gas and water pretty freely, and looked as though there may be a good area of solid coal ahead. This new portion of the mine was being lit by safety-lamps.

*Taratu Mine, Kaitangata* (Trustees of the late James Fraser, owners).—(21/5/97): This mine has been worked by the owners for several years, almost, if not exclusively, for their own use; it is in very good order. The coal is of excellent quality for its class.

*Lakeside Mine, Kaitangata*.—(21/5/97): This mine is on the property (Fraser's Taratu Estate) leased to the Tuakitoto Coal Company, and was sublet to P. Welsh, who worked a portion of it for a short time. It had ceased work at the time of my visit, but appeared to have been operated in a very slipshod fashion. The coal is upwards of 30 ft. thick, with a very gentle inclination. The Tuakitoto Company are not working any part of the estate at present.

*Coal Creek, Roxburgh* (John Jones).—(29/10/97): Coal is being worked opencast to a depth of from 40 ft. to 50 ft. It is not known how much deeper the coal extends. The stripping is in a decidedly rough state. Called attention to this, and the necessity for keeping the ground well sloped back above the coal. Proceedings were taken against Mr. Jones in November for neglecting to furnish correct returns of output, &c., and also for neglecting to pay contributions to the Coal-

miners' Relief Fund, in contravention of section 68 and 69 of "The Coal-mines Act, 1891." He was fined £5 for each offence; £10 in all, with costs.

*Mrs. McPherson's Pit, Coal Creek, Roxburgh.*—(29/10/97): An opencast pit, similar to Jones's. Working about 30 ft. thick; depth of coal not known. Face in fair order, but more stripping is wanted. Drew attention to this, and requested the men to remove a piece of stripping which looked unsafe. A small engine and boiler is now used for draining the working. It appears to me that a good pipe-drain would answer the purpose at far less cost, if properly constructed.

*Perseverance Coal-mine, Coal Creek, Roxburgh* (James Craig).—(29/10/97): The coal here is almost vertical, and about 100 ft. wide horizontally. It was formerly worked opencast, but is now entered by an adit-level which has been driven about 10 chains in the coal, which took fire some time ago. The pit was flooded to extinguish the fire, and, owing to this, the drive has collapsed for some 2 chains back from the face. Work is now in hand to reopen the inner end of the drive.

*Alexandra Colliery, Alexandra* (W. A. Thomson, owner).—(5/5/97): This pit is entered by a dip-tunnel, and also by a small shaft about 50 ft. deep, both of which are used (as may be most convenient) for raising the coal, all of which is filled into bags underground. The seam is probably 14 ft. thick. The lower portion only is being worked, on the pillar-and-stall system. The places all in good order, and ventilation adequate. Very satisfactory arrangements are made for fencing both shaft and tunnel. No pumping is necessary, the water being led away by an adit-level. (15/11/97): Workings in very nice order; ventilation good.

*McQueenville Coal-mine, Alexandra* (R. Lett).—(15/11/97): There are two shafts: one, used for winding and pumping, is 70 ft. deep; the other is an upcast and travelling shaft, fitted with good ladder-way, and 30 ft. deep. The seam is some 14 ft. thick, the lower half only being worked on the bord-and-pillar system. To get anything like the whole of the coal, the system adopted at Alexandra will have to be very materially altered. Workings in nice order, and ventilation good.

*Dungey's Pit, Cambrian's* (C. Dungey).—(16/11/97): An opencast pit, containing a thickness of 9 ft. of good lignite, overlaid by 11 ft. to 12 ft. of gravel. Stripping-work now in progress, to expose sufficient lignite to meet season's demands. The lignite is underlain by a good oil-shale of varying thickness, averaging perhaps 2 ft. 6 in. Place in very fair order.

*Hughes's Pit, Cambrian's* (J. O. Hughes).—(16/11/97): This pit is also worked opencast, but it is in a disgraceful condition, and no systematic method is adopted. Considering the heavy stripping above the lignite, I am of opinion that underground mining would be preferable. Oil-shale underlies the lignite, similarly to Dungey's pit.

*Blackstone Hill Pit* (A. Dunsmuir).—(17/11/97): A face of good lignite is being worked to a depth of 16 ft., but the lessee thinks it may be 30 ft. thick. About 5 ft. of stripping has to be removed. None is taken off in advance, and in one place it looked dangerous. I cautioned Dunsmuir about this, and requested him to remove a reasonable area of stripping in advance of his working-face.

*Beck's Pit, Idaburn* (Charles Beck).—(18/11/97): This property adjoins White's. Seam, say, 35 ft. thick, overlaid by 7 ft. to 8 ft. of stripping. There is not nearly enough ground stripped off in advance. Drew attention to this. Shale underlies the lignite.

*McLean's Pit, Idaburn* (L. McLean).—(18/11/97): A small opencast pit adjoining White's. Nothing stripped in advance. McLean does very little trade himself, but is mostly employed by White.

*White's Pit, Idaburn* (John White).—(18/11/97): Lignite from 18 ft. to 20 ft. thick; is worked opencast. Underlying the lignite is a deposit of oil-shale similar to that at Cambrian's, but it appears considerably thicker. The ground is kept well stripped in advance of the working-face. Drainage is effected by a new pulsometer steam-pump.

When at Idaburn I learned that nothing had been done at Fennessy's pit for several months; also that Docherty's pit, at Gimmerburn, was about worked out, and that Docherty was engaged in prospecting for more coal or lignite.

*Border Coal-pit, Idaburn* (G. Turnbull).—(18/11/97): Lignite worked opencast. Nobody about. Very little work appears to have been done for some time.

*Commercial Coal-pit, Kyeburn Diggings* (C. Archer).—(19/11/97): The seam here is vertical, 10 ft. wide, and worked in the same way as a quartz reef. Shaft is 60 ft. deep, the winding- and pumping-power being by water-wheel and endless rope on to a small drum over the shaft. Second outlet is by an adit-tunnel. Pit is in good order, and ventilation satisfactory.

*McCready and Coombe's Pit, Kyeburn Diggings.*—(19/11/97): This pit is almost worked out, and trade practically nil.

*Cromwell Colliery, Cromwell* (Goodger and Stronach).—(14/5/97): This is practically a new pit. The shaft is 8 ft. 6 in. by 3 ft. 6 in. and 150 ft. deep. The engine is designed for both winding and pumping. Five days before my visit something had gone wrong with the pump, and during repairs an accident occurred to W. G. Stronach, who was acting as engineman. In consequence of this, work came to a standstill, and I could not get below ground, as water was well up the shaft. Report of accident under proper heading.

*Cardrona Coal-mine, Cardrona* (R. McDougall).—(15/10/97): An opencast pit. The coal is practically vertical, the thickness horizontally being about 30 ft. Owing to its situation near the snow-line, the mine is only worked about eight months in the year. Another length of stripping is about to be sluiced off to expose sufficient coal for the season's demand. Drew attention to the need of more batter on the sides of overlaying ground.

*Macale's Coal-pit, Gibbston Saddle.*—(14/10/97): The situation of this pit is 2,200 ft. above the Queenstown-Cromwell Road, and fully 3,000 ft. above sea-level. It is worked opencast, and is in a very rough and unworkmanlike condition; anything but satisfactory. The man at work stated that the water-race conveying the water used for sluicing off for stripping had broken down, but repairs were in hand. When completed, the ground I complained of would be sluiced away.

The seam appears about 30 ft. thick, dipping about 1 in 2 towards the hill. Comparatively little area appears available for future stripping, and underground mining will have to be resorted to when this limited area is worked out.

*Gully Pit, Roxburgh* (G. Cockburn).—(12/11/97): The pit is now stopped. It is said the quality of coal was not good, and did not pay to work. The workings are satisfactorily fenced off.

*Cowan's Coal-pit, Gibbston*.—(14/10/97): This pit is at present idle. A tunnel has been partially driven from a lower level in the gully than where the coal was previously got, but has not yet reached hard coal. I understand the place is under offer to a syndicate.

*O'Hagan's Pit, Pukerau* (C. O'Hagan).—(7/12/97): Lignite, 16 ft. thick, dipping 1 in 12. Bord-and-pillar system adopted. 12 ft. worked, leaving 4 ft. to support roof strata. Mr. O'Hagan keeps his pit in capital order, and maintains a good air-current.

*Dudley's Pit, Pukerau* (J. D. Dudley).—(7/12/97): Same seam as O'Hagan's, but worked opencast. It has been standing during the winter and spring months, and is now in anything but a nice state. Operations for stripping sufficient for season's demands are now being commenced. I pointed out the need of keeping the sides safe. It will be advisable to adopt underground mining soon, as the stripping is getting too thick to be economically worked.

*Heffernan's Lignite-pit, Gore*.—(6/10/97): Mr. Heffernan has leased this pit to G. Low and Co. It is worked opencast, the full thickness of lignite being about 30 ft. Did not find any one about except the lessor. Stripping is about 10 ft. thick, and not battered off at sides. I pegged out a reasonable line of batter, and left a note stating what was required for safety. The upper half of the seam is being worked at present, the remainder being left under foot for future work.

*Gutschlag's Pit, Gore* (J. Gutschlag).—(8/12/97): There is a thick seam of lignite here, which has been worked opencast at the outcrop. At this date the pit was half full of water, the face covered with *débris*, a few loads being got wherever possible, and altogether the pit was in a disgraceful condition.

*Leitzzy's Pit, Gore* (Michael Leitzzy).—(8/12/97): Opencast working. Lignite, 4 ft. to 7 ft. thick at face, which is well bared by removal of stripping. Very little has been done here for some time.

*Sarginson's Pit, Waikaka Valley Road, Gore* (J. H. Sarginson).—(8/12/97): This pit is closed at present.

*Hoffman's Pit, Gore* (J. Hoffman).—(8/12/97): An opencast pit. Full thickness of lignite, 9 ft., overlaid by sandy ground, say, 6 ft. thick. In fair order.

*Green's Pit, West Gore* (John Kenyon and Co., lessees).—(24/4/97): Messrs. Kenyon and Co. have recently taken this pit on a five years' lease. It was until lately worked by Stark and Sons. The seam is the same as worked by Smyth. The lessees propose to extend the workings to the dip. Working-places, roadways, and ventilation very satisfactory.

*Smyth's Pit, West Gore* (James Smyth, owner).—(24/4/97): The seam here is about 19 ft. thick, and the lignite of good quality. About 14 ft. is worked, leaving 5 ft. to 6 ft. to support the roof. The place is in very nice order, and ventilation all that could be desired.

*Knapdale Lignite-mine, Knapdale* (Irvine Brothers).—(24/9/97): The seam here is nearly vertical, and 26 ft. wide altogether. The entrance is by an adit-tunnel. About 15 ft. is worked. No timber needed. Ventilation excellent.

*Johnston's Pit, Waikaka Valley*.—(15/12/97): Lignite, 11 ft. thick; worked opencast. The seam is overlaid by drift-gravels, about 6 ft. of stripping being taken off. No appreciable area of surface is removed at date in advance of working-face. In other respects the pit is in very fair order.

*Pemble's Lignite-pit, Chatton* (James Harvey).—(24/9/97): The lignite here is practically vertical, and of considerable width. Very little is being done at present, but a good area of ground is stripped for the ensuing season's demands.

*Pacey's Lignite-pit, Chatton*.—(24/9/97): Mr. A. Perkins is at present working this pit. About 10 ft. of stripping overlies the lignite, and this ground is well stripped in advance of the coal-face. Mr. Perkins does not know the full thickness of the seam, but is working 14 ft. to the present drainage-level, with lignite underfoot.

*McGill's Lignite-pit, Wendon*.—(23/9/97): Opencast working. About 12 ft. of lignite overlaid by 6 ft. to 7 ft. of stripping, which is well back from the face, but at the sides needs battering off. Drew attention to this.

*McDonald's Pit, Wendon*.—(23/9/97): Mr. D. Nicoll is now working this pit. It is very similar to McGill's, and on the adjoining property.

*Edge's Pit, Wendon* (G. H. Evans).—(23/9/97): This pit is worked opencast, but, from the nature and thickness of the ground to be stripped, I think underground mining would be better and more economical. The lignite appears about 16 ft. thick. Mr. Evans keeps his pit in very creditable order.

*Black's Lignite-pit, Greenvale*.—(23/9/97): This is an opencast pit, showing a face of lignite 12 ft. thick. It is worked for a few months each year, principally for the use of farmers and threshing-mill owners. At present full of water. A good deal of stripping will be required before much area of lignite is available for working. Pointed out the necessity of stripping well in advance, and giving ample batter to the sides when work is resumed.

*Hill's Pit, Waikaia* (Philip Hill, owner).—(23/4/97): Another opencast pit. About 5 ft. thick of lignite visible, overlaid by a band of greasy clay not more than 1 ft. thick. Above this is something like 40 ft. of auriferous gravel, which is usually sluiced off. At this date the seam was being worked in a most dangerous fashion. There was practically nothing stripped in advance of the face, and the gravel was in very nice order for the first rainfall to bring down about 150 tons. I cautioned the men as to the risk they were running, and wrote the owner requiring him to take steps to make the place safe. Hill's and Cosgrove's pits are the only places now working lignite in the locality.

*Argyle Pit, Waikaia* (J. B. Cosgrove, owner).—(23/4/97) : This is an opencast pit, about eight miles above the township. The lignite is about 10 ft. thick, overlaid by 3 ft. of stiff blue clay below the surface clay and soil. A fatal accident occurred here on the 6th April. The place is very roughly kept, but the man employed promised to put it into better shape. Wrote owner about it.

*Sleeman's Waimumu Mine, Mataura*.—(12/5/97) : The working-face having got below the level from which drainage could be economically effected, Mr. Sleeman has closed the pit he was recently working, and is at present drawing his supplies from a pit close by which he keeps as a reserve. He has recently bought another property, which will shortly be opened out. In the meantime he has preparations in progress for materially promoting efficiency and economy in working the new pit. To avoid the necessity for pumping, he is having a tunnel driven from the Mataura River. This will give free drainage to a considerable area of ground. The seam, which is identical with the others in the immediate locality, dips about 1 in 12. It will be worked opencast. A substantial loading-bank and depot are being constructed, also a tramway 45 chains in length to connect with the mine. Mr. Sleeman's works are very satisfactory; everything kept in first-class condition.

*Bogside Mine, Mataura* (H. Brown, lessee).—(12/5/97) : This mine is just commencing work. Same lignite as Beattie and Coster's. A small steam-boiler and Tangye duplex pump have been put down to keep the place drained.

*Beattie and Coster's Lignite-mine, Mataura*.—(12/5/97) : There is a thickness of 16 ft. of good solid lignite here, overlaid by 12 ft. of gravel and 2 ft. of soil, making a total stripping of 14 ft. These people work their pit very well, and keep a good area stripped. This enables them to keep their supply well up to meet demands. Drainage is by a centrifugal pump driven by a portable engine.

*Graham's Pit, Fairfax* (P. S. Graham).—(1/12/97) : Lignite-mine; entered by adit-levels. Seam nearly flat; capital roof. Places in capital order, and ventilation excellent. There is no scarcity of timber—in fact, more timber is used than there is any need for. Thickness of seam, 5 ft. 6 in.

*Salton's Pit, Fairfax*.—(1/12/97) : Mr. Salton is working a seam of lignite 5 ft. thick. The seam is very flat, and has a good roof. Workings are very limited, and in fair order.

*Isla Bank Pit, Fairfax* (M. Slattery).—(1/12/97) : A face of lignite 6 ft. thick is worked here. It is overlaid by 4 ft. of hard blue clay and 8 ft. or 9 ft. of surface clay, which are kept well stripped, but, considering the depth of stripping in relation to the thickness of seam, I think underground mining would be preferable.

*Nightcaps Coal Company's Colliery, Nightcaps*.—(11/6/97) : The operations here are in two sections—viz., the dip-workings adjoining Reed's mine and the level-tunnel workings. In the former the coal is about 10 ft. thick. It is very jointy, and needs careful working. The timbering and general arrangements for safety appear to have careful attention. The level-tunnel workings command three distinct seams, having an aggregate thickness of coal of some 36 ft. to 38 ft. The coal is very tough, requiring to be well holed before blasting. Timbering is well attended to, and good heavy timber used. To increase the ventilation (which I found very satisfactory) a new furnace has been built, and the flue arched in brickwork to the upcast shaft. The screens and loading-bank have recently been roofed over.

*Reed's Morley Pit, Nightcaps*.—(11/6/97) : This is an opencast pit. The coal is identical with that worked to the dip by the Nightcaps Coal Company, and is here overlaid by about 4 ft. of stripping. The place is in very fair order. At present time coal is being taken from part of a county road, the ground to be made good afterwards. Traffic on this piece of road is nil.

*Alley's Pit, Nightcaps*.—(14/7/97) : This is an opencast pit, but, owing to there being no proper road to it, work cannot be carried on during the winter. It is worked during part of the summer months, principally supplying the local farmers with coal for the threshing season. At present the pit is nearly full of water, and Alley is employed at Morley Pit.

*Slaughter-yards, Mataura*.—(12/5/97) : The Southland Frozen Meat and Produce Export Company (Limited) have opened out some lignite at their slaughter-yards, principally for their own use as fuel for the digestors, &c., used in tallow-melting, &c. The pit is an open quarry.

*Hyde Lignite-pit*.—(21/8/97) : A small mine was opened here by Mr. W. Lindsay, but the quality is so very poor that he gave it up. The tunnel-entrance was properly fenced off by a substantial gate, which was locked. I obtained the key, and looked inside. Very little work has been done. A few bags of coal are occasionally taken out for use at cottages close by. No returns have been made.

*Orepuki*.—(3/9/97) : The coal- and shale-mine is completely at a standstill, the plant at the shaft dismantled, and the dip-drive full of water. The place is, I understand, under offer to a syndicate. It is thought the shale might be profitably used for the manufacture of oil and other products.

#### ACCIDENTS AND FATALITIES.

*Argyle Pit, Waikaia*.—William Bemrose, forty-three years of age, was working at the coal on the 6th April. A piece of stripping fell over the coal where he was working, knocking him down, and rupturing the bladder. He died on the way home. This was his first day at this mine, and he had only changed places with his mate a few minutes previous to the accident.

*Cromwell Colliery, Cromwell*.—William Grant Stronach, engineman, was in charge of repairs to pumps on Sunday, the 9th May. The column-pipes were being lowered after some repairs about the working-barrel, their weight being carried partly by the winding-rope and partly by another wire rope attached to beams at the surface, the surplus portion of this rope being coiled up near one of the main legs of the head-gear. Unfortunately, the winding-drum had been thrown out of gear with the engine. Stronach was standing with one foot inside the rope-coil referred to, directing operations, when the lashings gave way, and the pipes fell down the pit, taking a portion of both ropes with them. Stronach's foot was cut clean off by the violent shock of the rope against

the head-gear. He was conveyed to the hospital. Mortification subsequently set in, and he died on the 21st May.

*Walton Park Colliery, Green Island.*—David Gillies, fifty-nine years of age, engineer and engine-driver at this mine, was killed by falling down the shaft on Monday, the 18th October. On the previous day, when winding water, the spur wheel of the winding-drum broke. The pumps with which the winding-engine can be connected were set to work. One of the pipes was leaky, and the deceased volunteered to repair it. He went down about 80 ft. (where the leak was) on the shaft-buntons, saw what was wanted to effect repairs, and came up to make preparations. On again descending (immediately in front of another man) he is reported to have given a heavy sigh and then fell. He may have missed his footing, or it is possible failure of the heart's action may have taken place, brought about by excitement, and the exertion of climbing by the buntons. In the absence of a *post-mortem* examination it is difficult to say with certainty, but I think this was very probable.

*Kaitangata Colliery, Kaitangata.*—Thomas Dixon and John Brown were injured on the 16th November. The men were working at a pillar between two levels near the edge of the goaf. The coal was quite soft. Dixon was working coal out of a lower division of the seam, when a piece of the upper soft coal shook down, falling on Dixon, and injuring his leg. It is stated that Dixon, in falling down, knocked Brown down with him, and that Brown, in falling across a tram-rail, injured his ankle. No blame is attributable.

*Shag Point Colliery.*—A miner named James Foster had his right arm broken at the wrist by a fall of coal on the 25th February. This was prior to my taking duty. On the 1st July a young man named William Boddy, who works at this colliery with his father, had a narrow escape of being killed by a fall of stone. He was severely bruised, and off work for a few weeks. I investigated the case, and found no blame attached to any one.

*Nightcaps Colliery, Nightcaps.*—William O'Brien was permanently lamed by a fall of earth at some opencast work on his property on the 6th January. As this was some time previous to my taking up my present duties I am unable to report on the matter.

Some other accidents have occurred at the mines, but all of a trifling character, and incidental to the work of coal-mining.

#### GENERAL.

I am sorry to have to record the fact that considerable difficulty is experienced in obtaining the statutory returns of output, &c., from the owners of several small coal-mines. In one case proceedings were instituted, and a conviction obtained, for neglecting to make returns, and to pay the required contribution to the Coal-miners' Relief Fund. Several people who were in arrear with their contributions have paid up, and, as better means for collection have been adopted, I do not anticipate much further trouble in this direction in the future.

I have, &c.,

JOHN HAYES,

Acting Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

## APPENDIX I.

## STATISTICS OF WORKINGS IN COAL-MINES, 1897.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Beams worked.	Thickness of Beams.	Thickness worked.	Dip of Beam.	System of Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1897.			Approximate Total Output to 31st December, 1896.	Approximate Total Output to 31st December, 1897.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.			
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Tons.	Tons.	Tons.			Tons.	Tons.	Tons.		Above.	Below.	Total.			Stroke.	Size of Barrel.	Height of Column.
NORTH ISLAND.																													
KAWAKAWA DISTRICT.																													
Kawakawa	..	3½	semi-bitum.	1	18' to 10'	the whole	1 in 5	bord and pillar	1	5' x 3'	40'	edit incline	11,134	..	11,134	794,845	27,041	2	10	12	horse	..	..	..	natural	11/10/97			
New Bay of Islands Coal Co.	Ross, John	9	"	1	6' to 7'	"	1 in 7	"	..	6' x 5'	420'	edit rail	2,142	..	2,142	82,183	84,325	3	7	10	horse	..	..	..	"	28/5/97			
HIKURANGI DISTRICT.																													
West Bryans	Smith, Charles	..	..	..	..	..	..	..	..	..	..	edit and engine incline	..	..	..	1,210	1,210	..	..	..	..	..	..	..	..	..			
Walton and Graham's	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
Hikurangi Coal Company	Moody, T. P.	4	semi-bitum.	1	7' to 16'	the whole	1 in 6	bord and pillar	4	6' x 9'	..	edit and engine incline	30,663	..	30,663	61,038	91,701	7	42	49	engine	..	..	..	natural	9/10/97			
Phoenix	Gould, Charles L.	3	"	1	10'	6' to 10'	1 in 8	"	14' x 2' 6"	240'	edit incl. incline	5,026	..	5,026	4,997	10,023	1	9	10	horse	..	..	..	"	9/10/97				
Hikurangi Colliery..	Kerr, George	1	"	1	12'	8'	irregular	opencast	..	..	..	incline	4,484	..	4,484	..	4,484	16	16	horse.	..	..	..	"	9/10/97				
WHANGAREI DISTRICT.																													
Kamo	Griffin, J.	3½	brown	1	3'	8'	irregular	bord and pillar	1	14' 8" x 2' 8"	157'	edit	1,037	..	1,037	225,037	225,037	..	..	5	horse	..	..	..	natural	12/10/97			
Kamo New	..	..	"	..	..	..	..	..	..	..	..	..	..	..	..	70,853	70,853	..	..	..	..	..	..	..	..	..			
Whauwhau	..	..	"	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
Ngunguru DISTRICT.																													
Kiripaka	Wright, Edward S.	5	semi-bitum.	1	3' to 10'	the whole	1' in 9' 2"	bord and pillar	6	8' x 5'	1,849'	edit incline	16,248	..	16,248	55,454	71,702	10	34	44	horse	..	..	..	natural	18/10/97			
Waikato DISTRICT.																													
Waikato	Wallace, William	9	brown	1	8' to 16'	12'	1 in 7½	"	2	6' x 5' 5" x 4'	522'	edit	18,317	..	18,317	180,988	194,255	10	20	30	"	..	..	..	"	18/12/97			
Taupiri Extended	Tattley, William	11	"	1	21' to 50'	7' to 22'	irregular	"	2	10' diam.	170' and 204'	shaft edit engine-incline	38,066	847	38,913	518,465	552,378	12	52	64	engine	..	..	..	duplex { 13" 5" 24" 7" 20" 24" }	18/12/97			
Taupiri Reserve	Harrison, Jonathan	11	"	1	18' to 24' 10' to 16'	10' to 16'	1 in 4½	"	2	9' x 6'	2,000'	edit engine-incline	18,870	..	18,870	141,592	160,462	14	45	59	"	..	..	..	2' 5" 210' exhaust steam	17/12/97			
Ralph's Taupiri	..	..	"	..	..	..	..	..	..	..	..	..	..	..	..	28,019	28,019	..	..	..	..	..	..	..	..	..			
Miranda, Bridgewater	..	..	"	..	..	..	..	..	..	..	..	..	..	..	..	20,668	20,668	..	..	..	..	..	..	..	..	..			
Bombay	Long, George	7	"	1	5'	the whole	irregular	driving	..	6' x 5'	200'	edit	..	..	25	50	75 occasionally	..	2	2	..	..	..	..	natural	..			
MOKAU DISTRICT.																													
Mokau	Lobb, Joseph	13	"	1	7'	7'	1 in 86	bord and pillar	..	8' x 7'	1,155'	edit	8,148	..	8,148	9,566	12,713	6	7	12	horse	..	..	..	"	not inspected			
Co-operative	..	..	"	..	..	..	..	..	..	..	..	..	..	..	..	940	940	..	..	..	..	..	..	..	..	..			
Totals	..	..	..	..	..	..	..	..	..	..	..	..	189,160	847,140,007	2,173,743	2,318,750	81,232	813	..	..	..	..	..	..	..	..			







## STATISTICS OF WORKINGS IN COAL-MINES, 1897—continued.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Beams worked.	Thickness of Beams.	Thickness worked.	Dip of Beam.	System of Underground Working.	Dimensions of Shafts.		Output delivered by			Output for 1897.			Approximate Total Output to 31st December, 1896.	Approximate Total Output to 31st December, 1897.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.	
									Number of Shafts.	Size of Shaft or Adit.	Depth of Shaft or Length of Adit.	Tons.	Tons.	Tons.	Tons.	Tons.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.			
MIDDLE ISLAND—continued.																												
CANTERBURY.																												
Springfield, Springfield	Barker, H.	21	brown	1	3' 9"	all	1 in 6	board and pillar	26' 6" x 4'	7' x 5'	70'	shaft	2,028	334	2,357	77,252	79,609	2	6	8	8	steam	direct acting steam	exhaust from pump natural	10/8/97			
Sheffield, Sheffield ..	Austin, J.	35	"	1	4'	"	1 in 3	ditto	..	7' x 5'	40ch.	dip incl. adit	2,905	..	2,905	44,915	47,290	2	6	8	8	horse	..	..	..	..	10/8/97	
Hombuh, Glentunnel	Brown, T.	25	"	1	7'	"	1 in 3	"	..	7' x 6'	..	adit	3,718	..	3,718	106,944	110,662	2	6	8	5	hand	..	..	..	..	11/8/97	
St. Helena, Whitecliffs	Leviok, H.	8	"	2	3'	"	1 in 2	"	..	6' x 4' 6"	30ch.	dip incl. adit	840	..	840	1,143	1,983	1	4	5	4	hand	..	..	..	..	13/8/97	
Hartley, South Malvern	Leeming, W.	2	"	1	5' 6"	all	1 in 6	"	..	6' x 6'	38ch.	adit	647	..	647	943	1,590	1	5	6	5	steam	..	..	..	..	18/8/97	
Wairid, South Malvern	Thompson, A.	0 1/2	"	1	5' 6"	"	1 in 9	open	..	6' x 4' 6"	..	adit	618	50	668	..	668	1	4	5	4	hand	..	..	..	..	12/8/97	
Mount Somers, Ashburton	Park, G.	38	"	1	35'	"	1 in 1	open	..	..	68'	shaft	1,954	864	2,818	23,788	26,556	4	..	4	..	..	..	..	..	..	17/8/97	
Rutherford's, Albury	Young, W.	6	"	1	23'	10'	1 in 1	narrow	14' x 3' 6"	..	68'	shaft	152	..	152	1,221	1,373	1	1	2	..	horse	..	..	..	..	14/9/97	
Pits worked for Private use only.																												
Dalethorp, Springfield	Nuttall, A. J.	3	brown	1	..	..	..	narrow	1' 4' x 4'	..	90'	shaft adit	49	..	49	68	117	..	..	..	..	..	..	..	..	..	19/6/93	
Snowdon, Rakata Gorge	Gerard, W. (owner)	12	anthracite	1	14'	8'	..	"	..	..	..	adit	79	..	79	988	1,062	..	..	..	..	..	..	..	..	..	15/1/95	
Acheron, Lake Coleridge	Murpherson, J.	28	ditto	1	4'	all	..	"	..	..	..	adit	21	..	21	457	478	..	..	..	..	..	..	..	..	..	..	
Waiho Forks, Waimate	McPherson, D.	5	brown	1	..	..	..	open	..	..	..	adit	20	..	20	117	187	..	..	..	..	..	..	..	..	..	16/11/95	
Studholme (Stoney Creek), Waimate	Grant, W. (owner)	8	"	1	..	..	..	narrow	..	..	..	adit	6	..	6	84	90	..	..	..	..	..	..	..	..	..	28/6/93	
Craigieburn, West Coast Road	Manson, D.	1	"	1	..	..	..	"	..	..	..	"	30	..	30	..	30	..	..	..	..	..	..	..	..	..	..	
Pits not now at work.																												
Kowai Pass, Springfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	559	559	..	..	..	..	..	..	..	..	..	..	
Glenroy, South Malvern	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	115	115	..	..	..	..	..	..	..	..	..	..	
Whitecliffs, ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	83,051	88,051	..	..	..	..	..	..	..	..	..	..	
Duke's (Park Gate), Kakahu	Worked a short time early in the year	..	..	..	..	..	..	..	..	..	..	..	..	..	..	916	916	..	..	..	..	..	..	..	..	..	..	
Spring Vale, Fairlie Creek	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200	200	..	..	..	..	..	..	..	..	..	..	
Mount Hutt, Rakata Gorge	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	155	155	..	..	..	..	..	..	..	..	..	..	
Brookley, South Malvern	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Hartley, ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	82	82	..	..	..	..	..	..	..	..	19/9/97	
NORTH Otago.																												
Wade's, Kurov	Scott, D	18	brown	1	15'	7'	vertical	stopping	16' x 2' 6"	..	53'	adit	885	..	885	5,074	5,459	..	..	..	..	horse	..	..	..	..	17/9/97	
Cairn's, ..	Cairns, W. B.	31	"	1	irregular	..	1 in 2 1/2	narrow	1' 4' x 3'	..	80'	dip incl. adit	684	..	684	10,980	10,984	1	2	3	8	"	..	..	..	..	17/9/97	
St. Andrew's, Papakaio	Nimmo, T.	19	"	1	8'	7'	1 in 3	board and pillar	14' x 2' 6"	..	60'	adit	1,233	..	1,232	21,981	23,213	2	8	5	..	..	..	..	..	..	..	16/6/97



STATISTICS OF WORKINGS IN COAL-MINES, 1897—continued.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Beams worked.	Thickness of Beams.	Thickness worked.	Dip of Beam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1896.			Approximate Total Output to 31st December, 1896.	Approximate Total Output to 31st December, 1897.	Number of Men ordinarily employed.		Power used for drawing Mineral.	Pumps.		Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.		Total.	Stroke.		
MIDDLE ISLAND—continued.																								
SOUTH OTAGO—continued.																								
Morrison's, Stirling	..	..	..	..	..	..	..	..	..	..	..	..	..	..	646	646	..	..	..	..	..	..	..	..
Pomahaka, Pomahaka	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	20	..	..	..	..	..	..	..	..
Castle Hill No. 1, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9,314	9,314	..	..	..	..	..	..	..	..
Crothead, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	207	486	693	..	..	..	..	..	..	..
Langridge, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	102	598	700	..	..	..	..	..	..	..
Lakeside, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,511	1,511	..	..	..	..	..	..	21/5/97
Lesmahagow, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	95	95	..	..	..	..	..	..	..
Cowpan's Owaka ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	45	45	..	..	..	..	..	..	..
Shennan's, Waipahi ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
CENTRAL OTAGO.																								
Coal Creek, Roxburgh	Jones, John	27	lignite	1	unknown	50' to 40'	variable	open	..	..	..	open	2,737	..	2,737	12,271	15,008	4	..	4	..	..	..	29/10/97
McPherson's, Roxburgh	McPherson, M.	27	"	1	"	99'	vertical	"	..	6' x 7'	..	adit	2,118	..	2,118	12,118	14,236	8	..	3	..	..	..	29/10/97
Perseverance, Roxburgh	Craig, James	10	"	1	99'	70'	vertical	board and pillar	25' x 2' 6"	60'	..	"	1,892	..	1,892	9,169	10,561	1	3	hand	..	..	..	29/10/97
Alexandra, Alexandra	Thomson, W. A.	18	brown	1	14'	7'	..	..	25' x 2' 6"	60'	..	"	3,894	..	3,894	21,382	24,776	1	5	horse	..	..	..	15/11/97
McQueen's, Alexandra	Letit, R.	11	"	1	14'	7'	..	shaft	24' 9" x 3'	62'	..	shaft	3,959	..	3,959	11,989	15,898	2	6	"	..	..	..	15/11/97
Bruce's, Alexandra	Bruce, A.	04	"	1	..	..	..	..	..	..	..	..	79	..	79	..	79	1	1	..	..	..	..	..
Harrex and Owen's, Cambrian's	..	04	"	1	..	..	..	..	..	..	..	..	60	..	60	..	60	..	..	..	..	..	..	..
Cambrian's, Cambrian's	Dungey, C.	13	lignite	1	9'	all	..	open	..	..	..	open	790	..	790	11,279	12,069	3	..	3	..	..	..	16/11/97
Welshman's Gully, Cambrian's	Hughes, O.	36	"	1	30'	..	..	"	..	..	..	"	1,189	..	1,189	21,710	22,899	4	..	4	..	..	..	16/11/97
Blackstone Hill, Blackstone Hill	Dunamuir, A.	31	"	1	unknown	16'	..	"	..	..	..	"	464	..	464	1,755	2,219	1	..	1	..	..	..	17/11/97
Rough Ridge, Idaburn	Beck, C.	11	"	1	35'	all	..	"	..	..	..	"	1,204	..	1,204	10,674	11,878	2	..	2	..	..	..	18/11/97
McLean's, Idaburn	McLean, L.	..	"	1	..	..	..	"	..	..	..	"	254	..	254	157	411	1	..	1	..	..	..	18/11/97
Idaburn, Idaburn ..	White, John	27	"	1	20'	"	..	"	..	..	..	"	683	..	683	28,621	29,304	2	..	2	..	..	..	18/11/97
Border, Idaburn ..	Turnbull, G.	27	"	1	12'	"	..	"	..	..	..	"	442	..	442	4,071	4,513	1	..	1	..	..	..	18/11/97
Gimmerburn, Gimmerburn	Docherty, C.	32	"	1	12'	"	..	"	..	..	..	"	211	..	211	1,982	2,193	1	..	1	..	..	..	18/11/97
Commercial, Kyeaburn	Archer, C.	18	brown	1	10'	8'	vertical	stopping	..	..	..	shaft	542	..	542	10,867	11,409	1	2	water	..	..	..	19/11/97
Kyeaburn, Kyeaburn	Coombes, W.	24	"	1	8'	6'	..	"	..	shaft	900'	edit	26	..	26	15,230	15,316	1	1	hand	..	..	..	19/11/97
Walkerieri, Clyde	John Smart (secretary)	15	"	1	20'	..	1 in 1	"	..	..	..	edit	983	..	983	19,389	20,322	..	8	"	..	..	..	..
Dairy Creek, Clyde	Marie, O. T.	25	"	1	unknown	..	..	..	..	..	..	incline	6	..	6	3,731	3,737	..	..	"	..	..	..	..
Blackman's Gully, Clyde	Field and Hale	2	"	1	..	..	..	..	..	..	..	..	55	89	144	..	144	..	1	..	..	..	..	14/5/97
Cromwell, Cromwell	Goodger, J.	2	"	1	..	..	..	..	1	..	..	shaft	1,098	..	1,098	..	1,098	2	2	4	..	..	..	..
Cooper's, Cromwell	Cooper, J.	..	"	1	..	..	..	..	..	..	..	adit	220	..	220	no return	..	2	2	..	..	..	..	..
Kawarau, Bannockburn	Pryde, J.	20	"	1	8'	all	1 in 4	board and pillar	1	6' x 6'	34'	incline	805	..	805	19,572	20,377	1	2	3	..	..	..	..
Excelsior (Parell and Gibson), Bannockburn	Gibson, J.	5	"	1	5' 6"	"	1 in 4	ditto	1	..	..	"	981	..	981	69	1,000	1	2	8	..	..	..	..
Bannockburn, Bannockburn	Wilson, T.	8	"	1	5'	"	1 in 4	"	1	6' x 4'	20'	adit	258	..	258	768	1,021	1	1	2	..	..	..	..
Nulli Secundus, Bannockburn	(late P. O'Brien)	..	brown	..	20'	all	..	..	..	..	..	..	..	..	..	632	632	..	..	..	..	..	..	..
Nevia, Nevia	..	4	..	1	..	..	..	..	..	..	..	open	50	..	50	200	250	1	..	1	..	..	..	..
Ryder's, Nevia	Scott, C.	..	..	..	..	..	..	..	..	..	..	..	40	..	40	..	40	..	..	..	..	..	..	..

MIDDLE ISLAND—continued.



STATISTICS OF WORKINGS IN COAL-MINES, 1897—continued.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Beams worked.	Thickness of Beams.	Thickness worked.	Dip of Seam.	System of Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1897.			Approximate Total Output to 31st December, 1896.	Approximate Total Output to 31st December, 1897.	Number of Men ordinarily employed.		Power used for drawing Mineral.	Stroke.	Pumps.		Height of Column.	Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Tons.	Tons.	Tons.			Above.	Below.			Total.				
																							Coal.			
MIDDLE ISLAND—continued.																										
SOUTHLAND—continued.																										
Graham's, Fairfax ..	Graham, P. S. ..	19	lignite	1	5' 6"	all	..	bord and pillar	..	..	adit	Tons. 534	Tons. ..	Tons. 534	Tons. 10,808	Tons. 11,842	..	2	2	hand	..	..	..	natural	1/12/97	
Spey Bank, Fairfax ..	Salton, R. ..	4	"	1	5'	"	..	ditto	..	..	"	62	..	62	311	373	..	1	1	"	..	..	..	"	1/12/97	
Isla Bank, Fairfax ..	Slattery, M. ..	17	"	1	6'	"	..	open	..	..	open	408	..	408	3,433	3,841	1	..	1	..	..	..	..	..	1/12/97	
Nightcaps, Nightcaps ..	Lloyd, John (W. Handyside, business manager)	16	brown	3 38' in the aggregate	..	..	..	bord and pillar	..	..	adit	22,762	..	22,762	168,656	191,418	13	41	54	horse	..	..	..	furnace	11/6/97	
Morley Pit, Nightcaps ..	Reed, William ..	12	"	1	10'	all	..	open	..	..	open	2,478	..	2,478	11,186	13,614	8	..	8	..	..	..	..	..	11/6/97	
Alley's, Nightcaps ..	Alley, Jesse ..	5	"	1	7'	"	..	"	..	..	"	100	..	100	364	464	1	..	1	..	..	..	..	..	14/7/97	
Pits worked for Private use only.																										
Waikoitohi, Pukerua ..	Kirk, William ..	10	"	1	6'	all	..	open	..	..	open	12	..	12	218	230	..	..	..	..	..	..	..	..	26/10/96	
Glover's, Pukerua ..	Glover, A. ..	3	"	1	..	"	..	"	..	..	"	15	..	16	30	45	..	..	..	..	..	..	..	..	..	
Porter's, Pukerua ..	Porter, D. ..	3	"	1	..	"	..	"	..	..	"	..	..	..	22	22	..	..	..	..	..	..	..	..	..	
Reid's, Waikaka Valley ..	Reid, R. ..	1	"	1	..	"	..	"	..	..	"	15	..	15	..	15	..	..	..	..	..	..	..	..	15/12/97	
Southbrook, Waikaka ..	Ayson, W. ..	3	"	1	..	"	..	"	..	..	"	35	..	35	55	90	..	..	..	..	..	..	..	..	15/10/95	
Otama, Otama ..	Graham, T. ..	4	"	1	..	"	..	"	..	..	"	35	..	35	80	115	..	..	..	..	..	..	..	..	21/10/95	
Slaughter-yards, Mataura ..	(Freezing-works use)	1	"	1	..	"	..	"	..	..	"	83	..	83	..	83	..	..	..	..	..	..	..	..	13/5/97	
Mutch's, Mataura ..	Mutch, James ..	7	"	1	4'	all	..	"	..	..	"	27	..	27	183	210	..	..	..	..	..	..	..	..	28/10/96	
Smith's, Mataura ..	Smith, Hugh ..	4	"	1	4'	"	..	"	..	..	"	12	..	12	15	27	..	..	..	..	..	..	..	..	9/10/95	
River View, Mataura ..	Nicoll, L. D. ..	6	"	1	..	"	..	"	..	..	"	30	..	30	515	545	..	..	..	..	..	..	..	..	9/10/95	
Wyndham, Wyndham ..	Walker, W. ..	3	"	1	..	"	..	"	..	..	"	20	..	20	34	54	..	..	..	..	..	..	..	..	8/10/95	
Marshall's, Edendale ..	Marshall, H. ..	6	"	1	3'	"	..	"	..	..	"	60	..	60	260	320	..	..	..	..	..	..	..	..	8/10/95	
Jones's, Edendale ..	Jones, E. and A. ..	3	"	1	..	"	..	"	..	..	"	45	..	45	140	185	..	..	..	..	..	..	..	..	8/10/95	
Neill's, Edendale ..	Neill, Thomas ..	2	"	1	..	"	..	"	..	..	"	11	..	11	50	61	..	..	..	..	..	..	..	..	8/10/95	
Mount Linton, Mount Linton ..	Chalmers, N. G. ..	7	"	1	10'	8'	..	"	..	..	"	60	..	60	493	542	..	..	..	..	..	..	..	..	25/10/94	
Pits not now at work.																										
Perseverance, Pukerua ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	2,052	2,052	..	..	..	..	..	..	..	..	..	
Frank's, Pukerua ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	45	45	..	..	..	..	..	..	..	..	..	
Rejsky's, Gore ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	57	57	..	..	..	..	..	..	..	..	..	
Chukoski's, Gore ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	28	28	..	..	..	..	..	..	..	..	..	
Kirk and Sheddou, Gore ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	140	140	..	..	..	..	..	..	..	..	..	
Fryer's Excelsior, Gore ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	807	807	..	..	..	..	..	..	..	..	..	
Dryden's, Gore ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	438	438	..	..	..	..	..	..	..	..	..	
Kingdon's, Gore ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	27	27	..	..	..	..	..	..	..	..	..	
Edge's (No. 14 Section) Waikaka ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	458	458	..	..	..	..	..	..	..	..	..	
Westbrook, Greenvale ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	175	175	..	..	..	..	..	..	..	..	..	
Middlemis, Greenvale ..	..	..	..	..	..	..	..	"	..	..	"	..	..	..	15	15	..	..	..	..	..	..	..	..	..	





1898.  
NEW ZEALAND.

# WATER-CONSERVATION

(REPORTS ON) FOR MINING, IRRIGATION, DOMESTIC, FIRE EXTINCTION, AND OTHER PURPOSES.

*Presented to both Houses of the General Assembly by Command of His Excellency.*

## No. 1.

The COUNTY CHAIRMAN, Thames, to the Hon. the MINISTER of MINES, Wellington.

SIR,—

Thames, 12th October, 1897.

I have the honour to address you on the subject of my telegram of the 8th instant—viz., the construction of a water-race to carry ninety or a hundred sluice-heads of water, and I need not assert it would be a work of paramount advantage to this goldfield, and this fact is accentuated by the inadequacy of the present race to meet our requirements.

Orders are already given for the construction of three large batteries with all the modern appliances for gold-extraction—the Moanataiari Gold-mining Company, sixty stamps; the Thames-Hauraki Goldfields (Limited), sixty stamps; the Fame and Fortune, forty stamps. For the first two we have received applications for motive-power, and, if they are to pay, driving by water-power will be the greatest factor to insure success. These applications will be the heralds of many others, and are exclusive of any power which may be required for pumping the deep levels.

The scheme for which the Council applies for assistance is quite practicable, and the services of a consulting engineer are sought by advertisement to consider two plans for securing and delivering the supply. One is by an open race with a reservoir at its terminus, the other by a direct delivery through a main to the distributing-point in Grahamstown. The Council will necessarily be guided by the advice of its consulting engineer, and the result will be immediately communicated to you.

The Council is fully aware of the grave responsibility involved in the construction of this new race, but the future of the field is a consideration which fully justifies the Council in recommending it and the Government in adopting it. Trusting this proposal will secure your approval and its recommendation to your colleagues,

I have, &c.,

T. A. DUNLOP,  
County Chairman.

The Hon. Minister of Mines, Wellington.

## No. 2.

Mr. GEORGE WILSON, Inspecting Engineer, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,—

Mines Department, Wellington, 31st January, 1898.

Re low-level water-race from Kauaeranga Creek, for the construction of which the Thames County Council have made application to Government for the expenditure of £57,777 :—

As arranged with you, I met Messrs. Dunlop and Hollis, the Chairman and Clerk to the Thames County Council, and conferred about the low-level-water-race scheme. The plans were examined, Mr. E. F. Adams, the engineer, being present to point out various matters in connection with them. The plans have been carefully prepared, and the race is estimated to be capable of supplying eighty sluice-heads of water with a fall of 75 ft. The cost has been estimated on a sound basis, and, in my opinion, the work could be completed for the money.

The attached paper furnished by the Council shows that the present race supplies twenty-six sluice-heads of water, the gross revenue from which for the past ten years was £22,428 18s. 7d., or £2,242 per annum, being about £85 per sluice-head per annum. In making the estimate of revenue Mr. Hollis shows the yearly value of eighty heads from the new race to be equal to that of forty heads from the old race at £3 per week per head, which would amount to £156 per head per annum. This appears to be excessive, as for ten years past water from the present race has only yielded a gross revenue of £85 per head. The motive-power applied for amounts to thirty-eight heads, and is all for battery purposes; of these batteries, two, the Moanataiari and the Fame and Fortune, are almost completed, and the Thames-Hauraki Company have not as yet opened up the quartz reefs, nor is the erection of the battery commenced.



In view of the present stage of mining operations, I am doubtful whether or not the whole of the water would be used for any length of time for crushing purposes, even if it were at present available. I would therefore point out that until the development of mines at the Thames clearly shows that a sufficient quantity of payable quartz is available such large expenditure for increased water-power is not warranted, and I am of opinion that for the present a work of this magnitude should not be undertaken by the Government.

The plans and report by Adams and Harding I left with the County Council, for which I obtained a receipt from the Clerk.

I have, &c,

Geo. WILSON, Inspecting Engineer.

The Under-Secretary, Mines Department, Wellington.

### No. 3.

Mr. T. PERHAM, A.M. Inst. C.E., to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,—

Mines Department, Wellington, 24th June, 1898.

According to request by memorandum, dated the 2nd April (Mines 97/895), to continue my last year's reports upon water-conservation works on the goldfields of the colony, I proceeded on the 5th of that month to the Hauraki district as instructed, to examine into the best means of obtaining a supply of water for domestic purposes at the mining townships of Coromandel, Karangahake, Waihi, and Waitekauri, Te Aroha afterwards being included.

A report being also required upon the proposed low-level water-race from the Kuaeranga River to be constructed by the Thames County Council, and the work being of a different character to the other matters upon which I have to report, I propose to submit that first, and take the other localities in the order in which they were visited.

I have, &c.,

The Under-Secretary, Mines Department, Wellington.

T. PERHAM.

#### *Thames County Low-level Water-race.*

As previously arranged, I placed myself in communication with Mr. Hollis, County Clerk, and after going through the plans (which are produced in a clear and excellent manner) in company with Mr. McLaren, County Engineer, and Mr. Adams, the engineer who surveyed and designed the race as an additional water-power to Grahamstown, I went over the ground with those gentlemen, and made an examination from the intake to the terminal point at Karaka Creek proposed reservoir, to judge of the scheme being practicable.

The proposed head-works, with automatic gates, are situated at a convenient rocky point on the right bank of the Kuaeranga River, about three miles from and below the intake of the present high-level water-race, and near Stephen's Hotel, and the race follows generally the surface contour to the proposed reservoir. The gradient is 4 ft. of fall to the mile. The whole of the race is laid out in curves of a fixed radius of 193.5 ft. (which has the advantage that the pipe-sheets may be made to suit short chords, or cut to the curves) where the line is not direct, and the lowest radius used is 202.2 links. The distance from the head to the reservoir is about 5 miles 75 chains, made up as follows: Ground race, length 11,836 ft.; tunnels, length 9,132 ft.; flume on ground, length 6,614 ft.; flume on trestles, length 3,766 ft. The chords, tangents, and straights of the whole race are pegged from end to end, and it is designed to convey 100 cubic feet of water per second—i.e., 100 sluice-heads—and the total available head to high-water mark at Grahamstown is 76 ft. Ample by-washes, and all necessary manholes, valves, &c., are provided at convenient distances for the discharge of surplus water.

There is no doubt, I think, that by the employment of tunnels and pipes, although at first cost expensive, instead of all open ditching and box-fluming, thus avoiding a considerable cost in maintenance, that the most direct and *finally* economical route has been adopted. The country was prospected by Mr. Adams on the left, or opposite, bank of the river to decide any advantages by that route, but the distance found to be longer and more expensive generally, the sidelings being steep, and the only recommendation the compensation for land taken less in cost. By the selected route the difference in height between the low, or summer, water-level at the head of the race and high-tide level is practically 100 ft. The loss of head by the race is 24 ft., leaving 76 ft. of effective head at Grahamstown. This head is calculated to furnish six hundred effective horse-power for eight months of the year, and is claimed to be a valuable source of supply to the goldfield.

Quoting from Mr. Adams *re* a full delivery by race to the timber booms at Parawai, as against delivery by pipes to the same place: "The pipes necessary to deliver 100 cubic feet per second with a loss of even 37 ft. in friction-head would require to be 5 ft. in diameter, and the cost of work would be at least £10,000 more than by the present scheme, whilst the loss of fall would be more than double the present scheme, which from the booms is 8 ft. The effective head at the booms is 84 ft., so that the loss is 9.5 per cent. in the two miles distance." This is in favour of delivery by race to Grahamstown, as against the electrical transmission advocated.

As before mentioned, the tunnels to gain a direct route and also to avoid loose sidelings, frequent fluming, and consequent heavy maintenance are at first expensive, and with the pipes are the heaviest items in cost of construction. The total estimate for the whole undertaking is £57,777, but I am of opinion the work could be done for a somewhat less amount by making several modifications in the timber, piping, and general details of ironwork. An illustrative sketch-plan (a reduction of the original drawings), showing a longitudinal section and plan of the features of the race, together with the principal details of construction, is attached.

At the time of my visit, the 20th April, the river-water was very low, certainly not running more than from nine to ten heads, which represented the surplus of the water after serving the high-level race three miles higher up. This race is estimated to convey, generally, twenty-five heads for motive-power to the batteries at the Waioakaraka Flat, but at that time it carried about half.

As before remarked, the proposed race is designed to carry a hundred sluice-heads eight months in the year, running day and night, which means there must be 125 heads in the river for that period without the assistance of storage to supply the constant demand, and that for the remaining four months in the year the race would be only one-half full.

A good site for a large reservoir is available just below the proposed intake, but the timber-floatage rights would be interfered with, unless at a large outlay flood-gates to release the logs from the dam when required were constructed for the purpose.

Information as to an average rainfall in the Kauaeranga Valley is difficult to obtain, no record having been kept, and the absence of maps showing approximately the ridges of watersheds of drainage areas preclude even an average estimate of the mean river-discharge at the point of entry in the race. This being the case, I would suggest that before any work of construction is commenced it should be definitely decided that the water can be stored in sufficient quantity to tide over at least six months of the dry season; and also recommend that a series of close observations by gauging the stream be taken once a week, extending over a period of, say, twelve months, to obtain a mean of the maximum and minimum flow (excluding abnormal floods), from which data modifications, if required, can be made in the plans of the race as designed. In this trial an accurate transverse section of the river should be taken in a suitable reach near and above the proposed intake for obtaining the area and velocity, and a tide-gauge erected from which the rise and fall can be noted, and an accurate register kept. From my own observations of the indications on the river-banks for lodged *débris*, &c., I am forced to the conclusion that there is not sufficient water to fill the race in addition to that taken by the present high level.

With regard to there being sufficient demand at present for an extra hundred sluice-heads of water by this proposed race over and above the batteries stated to require it, no doubt it would tend to the development of the goldfield: water, it is represented, being wanted in the near future for the extension of Grahamstown and Shortland, and industrial purposes other than mining. Having only a limited knowledge, however, from my recent visit I am hardly prepared to say that such an expenditure is not warranted on increased water-power in proportion to the amount of quartz of payable quality available; at the same time, I consider that a work of such magnitude should not be undertaken by the Government until full and definite information can be obtained as to the quantity of water constantly flowing in the river. In conclusion, I have to thank Mr. Hollis, County Clerk, for his courtesy and assistance, also Messrs. McLaren and Adams for their readiness in affording information.

T. PERHAM.

#### *Coromandel Mining Township Domestic Water-supply.*

I now submit report on a domestic water-supply for this township, together with a general sketch-plan and plan of head-works:—

There can be no doubt that this is a matter of urgency, both on the score of health of the community and for the extinguishing of fires. Owing to the streams to the north-east of and running through the town being strongly impregnated by mineral acids from the numerous mining works in the hills, added to the impurity of water in the wells, typhoid fever and sickness generally prevail during the summer months, especially among the infant population, by people using other than rain-water in tanks, which are few connected with the private houses. I am inclined to think that to a large extent this mischief has been caused by the constant pumping on the low levels from the numerous shafts draining the wells, and in many cases contiguous cesspits, into and from one another through the porous, gravelly soil, and the inhabitants making use of the residue for drinking and household purposes. In evidence of this, old residents state that several small streams and wells formerly containing pure water are completely dried up, and others near these powerful pumps partially so. Surface drainage into the creeks, of course, does not tend to the health of the town.

Several schemes have from time to time been formulated for a pure water-supply. One to take water by a cut race from the Whangaraki (the principal creek running from north to south through the town) at a point just above the small tributary known as Madam's Creek to a reservoir on the Kahakaharoa Stream, and picking up the water from the Whakanekeneke, or Courthouse, Creek; thence in pipes down Ring's Road through the town to the sea-beach, in connection with a supplementary supply from the Karaka Creek; the intention being in this case to combine power for mining purposes with domestic and fire-extinguishing supply. Another to convey the water from the Waiau River, but to obtain sufficient elevation for pressure at the upper portion of the town it was found to be necessary to go up the river a distance of seven miles from the town, and, in addition to head-works, create filter-beds, &c., involving, besides a heavy first cost of over £15,000, annual expenses in cleaning and maintenance. I may here mention that the water in the Karaka Creek alone was not considered sufficient for a supply during the summer months.

An alternative suggestion has been also offered for sinking a well on the gravel flat near the Karaka Creek above contamination of drainage, and pump the water therefrom to a service or storage-reservoir near and on a suitable elevation, and from thence distribute the water through the town. This latter scheme, although quite practicable, would be a permanent charge in annual maintenance and wages, in addition to a rather heavy first cost for expensive perishable machinery. It appears to have been advocated only as the readiest means to supply immediate wants, pending a general extended gravitation system from the Waiau River.

Upon examination of the before-mentioned Madam's Creek I formed the opinion that its elevated position, commanding the whole town, and the volume of water (although limited) would have been the best adapted for the purpose, but a race to the Corley battery nearly monopolizes the creek-water, and I found that three or four rights exist, although one mine only been opened in the hills at the creek source, which would probably not contaminate the catchment area. There is a good site for a storage-reservoir 300 ft. above sea-level, and the creek runs about half a Government sluice-head in the driest season would be sufficient.

The Whakanekeneke, or Courthouse, Creek could also be used with advantage for the purpose, and at an elevation of 250 ft. an excellent site for a reservoir is available, but, unfortunately it is too close to the cemetery, and there are two or three gold-workings on the watershed, moreover, there are four prior rights in the stream. The other branch of the Courthouse Creek is a mere stream, well known to be strongly impregnated with mineral acids, and therefore out of the question.

Karaka, or "Cadman's," Creek is the only other water source suitable for the purpose, after a close examination, that has been selected in preference to going all the way up the Waikato River to obtain almost the same result, at about one-third of the cost. It is by far the most expedient on account of the comparative purity of the water and freedom from contamination by gold-workings on the catchment area. There are four existing rights in the creek, however, but, as far as I could ascertain, have never been made use of by the holders, and therefore may be resumed. With a view of settling the question at rest regarding the purity of the water, Mr. J. MacLaren, Director of the School of Mines at Coromandel has kindly given me an analysis of a sample of the water, which I quote: "This a clear, colourless, tasteless water, depositing only a very minute quantity of sediment on standing. After boiling for some time it has a feeble alkaline reaction. The fixed salts, or solids, are very low, amounting to 7.28 gr. per gallon, made up of alkaline chlorides (principally sodic chloride, or common salt) 4.6 gr. per gallon, and carbonate of lime, 2.4 grains per gallon. It must be termed a very soft water, and is therefore eminently suitable for steam or manufacturing purposes. With regard to its suitability for domestic purposes, I find it requires 0.149 gr. of oxygen to oxidize the organic matter in a gallon of water. This is a somewhat high factor, and the water is therefore of only ordinary purity. It must, however, be remembered that the sample was taken towards the close of a long period of drought, and that water then is not so pure as at any other time of the year. This percentage of organic matter, though large, will not invalidate it as a potable water, the more so as I failed to find any traces of albuminoid ammonia or other nitrogenous compounds, the presence of which would have infallibly indicated contamination." This, although not entirely satisfactory as a drinking-water, shows that there is no presence of contamination, and I think it may be taken as a fair sample of bush-water in similar localities after being filtered over several miles of a creek-bed of shingle and sand.

The catchment area, except on the left bank of the creek and at the source, is limited, but there is abundance of water, except at the driest season of the year, to supply five times the present population, which is estimated at not more than two thousand. The normal capacity of the stream (eliminating floods) may be taken at about 300,000 gallons per day of twenty-four hours at the point of intake, which is above three small tributaries, and gives the very liberal allowance of 150 gallons per head. At 30 gallons per head (the generally accepted rate) only 60,000 gallons per day would be required. There is, therefore, an ample margin for fire-extinguishing purposes, and, if required, driving power. The site for the intake chosen is at an elevation of about 150 ft. above sea-level and half a mile from the old mill, and will give a head of 140 ft. in the most thickly built part of the lower town around and about the bank corner; 100 ft. at the Presbyterian Church, Ring's Road; 90 ft. at the old Courthouse (present hospital); and at the Tramway Hotel and surrounding houses at Belleville a head of 60 ft., rather a low pressure at this point, but sufficient for purposes of fire-extinguishment. More elevation for the intake would have been better, but beyond the site chosen the creek-bed rises rapidly, and is very confined, full of heavy boulders and rocks, and the expense of the head-works would be at least double to get 50 ft. more elevation. The proposed head-works consist of a concrete weir 8 ft. in the mean height, built in the solid rock, with a rough filter-bed at the back, silt-pit in front, and on the side a flood-overflow, or by-wash, of 14 ft. This will impound, when the creek-bed is cleared of stranded timber and large boulders, about 340,000 gallons. An iron grid, as shown on the sketch-plan, will prevent floating snags and debris from entering the reservoir. A settling-tank of some description is necessary when the creek is in flood, and it may be as well perhaps to provide a reserve for future contingencies. The delivery-main from the silt-pit to the centre of the lower town would be 8 in. cast-iron pipes; the reticulation for the main street (Ring's Road) north as far as the post-office and south to the bridge at Woollams's triangle, 6 in. pipes; the remainder of the pipe-track, as shown on plan No. 1 in red lines, 4 in. pipes: the whole laid with tee branches at all places where water is likely to be needed eventually. Scour valves provided at the low levels and creek-crossings, stop-valves at suitable intervals, and fire-plugs at every two or three chains where most likely to be required. In roads or streets where there are at present only a few scattered houses 1½ in. and 1 in. wrought-iron pipes. Laying the water to the houses is not considered in the scheme, as I conclude that would be better left to the local authorities to come to some equitable arrangement with the residents requiring the water, unless it be made compulsory to take it.

A more direct route for the pipes would be to cross from Cadman's Mill, turning northward over the low saddle, and following the low ground to the junction of Ring's Road and Albert Street, but private land would have to be crossed. It is therefore better to avoid purchase or compensation by taking the pipes down Wangapoua Road to the junction with the Tiki Road, and thence into the lower town. An extension along the Tiki Road can be easily made if necessity arises. The cost of maintenance will be nominal, only requiring the cleaning of the shingle occasionally at the back of the weir, removal of any snags and debris from the grid, and the scouring of the bottom of the silt-pit and mains frequently.















The total cost of a water-supply as above indicated, including head-works, benching pipe-track in rock on right bank of creek, a small trestle-bridge at the old mill, laying of pipes with branches, valves, and all necessary fire-plugs, with contingencies and supervision, I estimate at £4,895 approximately.

In conclusion, I recommend that the reservoir should be securely fenced against the entrance of cattle, &c., for at least 2 chains wide from the weir on each side up the creek for a distance of at least 10 chains, and all decayed logs, &c., removed to preserve, as far as possible, the purity of the water. It is possible that, in the event of the work being carried out, the permanent levels taken, and final arrangements made, the scheme may be found capable of modification in only laying pipes, &c., in the streets sufficiently built on to warrant the expenditure, and thus supply the immediate wants of the town, and therefore the above estimate must be considered approximate. Still, as in all such undertakings, the first cost being the least I would recommend the laying of the mains to the extent indicated on the plan from Woollams's Triangle northward to the neighbourhood of the Tramway Hotel at Belleville. My thanks are due to Messrs. McCormick and Turner, also to Mr. Simmonds, County Clerk, for their ready assistance in my examination for the purposes of this report.

T. PERHAM.

#### *Karangahake Mining Township.—Domestic Water-supply.*

I now forward, together with a sketch plan, report on the above.

The town lies in the entrance to the deep and narrow gorge of the Ohinemuri River on the right bank, and at the junction with that river and the Whaitawheta Creek, and is about six miles south-east of Paeroa on the Waihi Coach-road.

With the exception of the business premises along both sides of the main street, which is parallel with and close to the bank of the river, nearly all the houses are scattered about the steep hillsides, which consist of rugged spurs and gullies running down from a range to the river. To systematically provide water, except in the main street, for such a place is not an easy matter, on account of the absence of properly graded roads and the irregular manner in which the houses are disposed; and, taking into consideration locality and small population, it will be comparatively expensive. The population is estimated roughly at between five hundred and seven hundred, counting what may be called the suburbs or outlying tenements. As there is always a probability of mining towns of this description extending, and perhaps rapidly in the near future, I think it would be well practically to provide for an increase of the present population to 1,500 at the usually accepted rate of 30 gallons per head per diem—namely, 45,000 gallons. The following recommendations are therefore based on this.

A never-failing supply of pure water can be attained from the Parapara Kauri or "Doherty's" Creek (running at the proposed intake about three-quarters of a Government sluice-head), and which has been reserved for the purpose. The creek joins the Ohinemuri River near to and north of the township.

Two schemes have been formulated, both taking water from the same and, in fact, only source: One to convey the water from the creek in almost a direct line, by means of pipes, along the sloping spur sidelings to a saddle on the hill at the back of the town, and there to construct a distributing-basin, and from thence the service-main being taken down a broad, convenient gully into the town. The alternative scheme is to convey the water from the same point in the creek either by an open race or pipes round the spur of the hill partly by the road following down the creek to the junction of Main Street with Butler's Road, marked "A" and shown in long red dots on plan. This route, in my opinion, would, in addition to being the most expensive, if pipes were used the whole way, and open to the objection if a cut race be used to expensive maintenance and liability of contamination from a large area of surface drainage. Again, from the point "A," in addition to the race or pipes from the intake, 23 chains of large piping would be required, which at the present time is not a necessary requirement for either fire-extinguishment or ordinary domestic purposes.

Under the circumstances, I think the first proposal is in every way the best and in the end prove to be the most satisfactory and economical.

The position selected in the creek for the intake or headworks is by aneroid barometer 325 ft. above the Ohinemuri River, and well above all habitations, as shown on the plan, and, when fenced, is free from any contamination, and is about a mile by the pipe-track, shown in firm red line, to the before-mentioned saddle, which is 250 ft. above the river. The headworks consist of a simple concrete dam, 5 ft. in height, built in the solid rock at the top of a small waterfall, and creating a useful little reservoir from a natural rock-bound pool, which is estimated to contain, when full, about 20,000 gallons, about two-thirds of which will be available for use, the remainder of the pond acting as a first filter and silt-bed. On the left bank of the creek a small supplementary silt-pit, with a rose-strainer and 3 in. stop-valve on the outside of the pit, is built in to shut off the water from the 3 in. supply-main when necessary. At the upper end of the reservoir is an iron and timber grating, similar to that described for Coromandel, to prevent any small snags or *débris* floating down the creek from entrance. This small pond, in addition to acting as the intake, is a silt-pit, and the supply of water will be useful in case of emergency and during the periodical cleansing of the service-tank hereafter described.

At the saddle it is proposed to excavate for and build, in a natural depression in a gully near and about 30 ft. below the 250 ft. level, a tank with a capacity of 45,000 gallons, or about one day's supply for fifteen hundred of a population. The tank is to be of concrete, with vertical walls, the top of which to be 2 ft. above the surrounding ground-surface to prevent entrance of surface-water, and, as it is in the bush, roofed over with curved galvanised iron to keep out falling branches, &c. To be fitted with a ball-valve to regulate the supply from the 3 in. pipe. Washout- and overflow-

pipes outside the tank, and a by-pass connected from the supply to the delivery-main to keep up an uninterrupted supply to the town in case of emergency, or while the tank is being cleaned out, as will be necessary from time to time to free it from sediment.

The delivery-main from the tank to the bottom of the gully, and passing through sections of E. and W. Brideson and Tregoweth, and crossing Butler's Road to Main Street, will be 6 in. cast-iron pipes, with a stop-valve outside the tank, and a pressure-valve and scour-valve at the bottom of the incline down the gully to Main Street. From this point the same 6 in. pipes will form the reticulation and continue up Main Street to the post-office, with branches at present only of 4 in. pipes at Bush Street and at Moresby Street, as shown in thick red lines on plan.

All the pipes to be laid with tees to provide for localities in which branches are likely to be required eventually, and the whole provided with stop- and scour-valves at suitable intervals, and fire-plugs or hydrants at every 3 chains or thereabouts.

In back roads or tracks up from Main Street and leading to the scattered houses about the spurs and gullies provision is made in the estimates for laying 1½ in. and 1 in. galvanised wrought-iron pipes, which can be done as wanted, and again lifted and replaced elsewhere with only a slight deterioration when the streets on the high levels are formed and the 4 in. mains extended.

This supply, I think, may be considered ample for the present population, and the only additional cost necessary as the population increases, however rapidly—having the head-reservoir and service-tank complete—will be an extension of the service-mains and small branches to the higher levels on both sides of the Ohinemuri River, and to the schoolhouse and other houses beyond in the gorge, as indicated by the dotted lines on the plan.

The cost of maintenance will be trifling and almost nominal, one man being all the labour wanted. The tank should be cleaned out occasionally, and the mains frequently scoured, especially at the bottom of the 6 in.-pipe incline from the tank to Main Street.

Both the headworks should be securely fenced to keep out cattle.

The approximate total cost of such a supply as above indicated, including headworks, supply-mains and -valves, two short and light trestle-bridges across the creek, concrete tank with adjuncts, delivery-main with pressure-valve, and all other necessary valves and fittings, I estimate at £1,916.

20th August, 1898.

T. PERHAM.

#### *Mining Township of Waitekauri.—Domestic Water-supply.*

A report on a water-supply for the above town is the next in rotation, and I forward herewith a sketch-plan showing the contour of the ground, the locality of the proposed reservoir, the headworks, and direction and limit of pipe-track, which I consider is sufficient supply for some considerable time beyond present requirements.

That pure water, as in the case of Karangahake, is urgently required cannot be doubted, for the Waitekauri River, on the bank of which the town is situated, on account of pollution by the cyanide plant in connection with the battery, as well as other workings higher up the river at the Golden Cross, is totally unfit for human consumption. The small streams running immediately through the town to the river are too insignificant to be used for the purpose, except by creating expensive storage; and, moreover, the riparian-right question here as elsewhere is very much in evidence. The only streams of any size are "The Irishman's" and another, both owned by the Waitekauri Gold-mining Company.

The population, at a liberal estimate, is not more than two hundred and fifty, counting all houses round and about the hills outside what may be deemed the town's extreme limits. Considering, however, the probability of extension in the near future, it is as well to provide for an increase to, say, five hundred, at the rate of 30 gallons per head per day of twenty-four hours—viz., 15,000 gallons, ample both for purpose of fire-extinguishing and ordinary domestic use (unless the increase in population is very rapid) for some years to come.

I am indebted to Mr. McLelland, a member of the Ohinemuri County Council, for accompanying me over the ground and pointing out a suitable little gravel-bedded stream in the hills to the north-west of the town and across the Waitekauri River. Its capacity is good and the water pure—that is, for bush-water—and as it is permanently running at a minimum of about 93 gallons per minute, which is far more than sufficient without storage, gives 268 gallons per head of population of 500.

The site chosen for the intake is in an almost direct line about 47 chains from the bridge over the river, and the elevation 145 ft. above Ryan's Hotel, which is situated in about the lowest portion of the town. The creek-bed at the point of intake is narrow and confined, and there are no indications of rock, although good clay for puddle crops out of the banks. Under these circumstances, although the works will not be of so permanent a nature as masonry or concrete, I propose a timber weir of the description indicated on the sketch-plan, with a small silt-pit on the outside, which can be frequently scoured and the water always kept clear. Inside the weir the reservoir thus formed is intended to be half-filled with shingle and fine gravel from the creek-bed to act as a rough filter, and a timber and iron grid, similar to those already recommended elsewhere, to exclude the floating *débris* and small snags from the pond. It would be well, as the place is in the bush, to provide for its being roofed over with a frame and galvanised iron to keep out falling leaves, &c.; also to erect a cattle-proof fence around it.

The supply-main of 6 in. cast-iron pipes will be laid entirely along the right bank of the stream until the waterfall is reached, then taken over the spur and down across Corbett's Flat to the bridge. Here I may mention that the land and the rights in the creek-water to the north-east of the Waitekauri River is in the hands of the Corbett family, and compensation for the loss of water and the pipes crossing the land is expected. From the bridge up the narrow right-of-way to the corner of the main street between Ryan's and Rae's hotels the 6 in. cast-iron pipes

from the headworks will stop, and 4 in. mains thence branch up the hill to the schoolhouse, there giving a head of 85 ft. from the reservoir, a fair pressure both for fire and ordinary domestic uses, and on the coach-road to Waikino past the post- and telegraph-office as far as the public hall, there giving a head of 70 ft. from the reservoir. The serving of these three streets or main roads embraces the inhabited portion of the town, with the exception of a few scattered dwellings here and there, for which provision is made in the estimate by means of 1½ in. and 1 in. galvanised-iron piping, which, as the settlement expands, can be taken up and relaid elsewhere to make room for the continuation of the 4 in. branch mains. Provision is made for branches in suitable positions. Two scour-valves—one at the bridge and one at the creek-crossing opposite Ryan's—only are necessary; and stop-valves, fire-plugs or hydrants, and small branches contingent on water being required for power are provided for.

The approximate cost of a service as above indicated, exclusive of compensation to the Corbett family, I estimate at £1,160.

The cost of maintenance should be merely nominal, one man only being required occasionally to scour the silt-pit and mains, except in cases of emergency such as fires.

6th September, 1898.

T. PERHAM.

*Approximate Cost of Paper.*—Preparation, not given; printing (2,700 copies), \$5 12 .

---

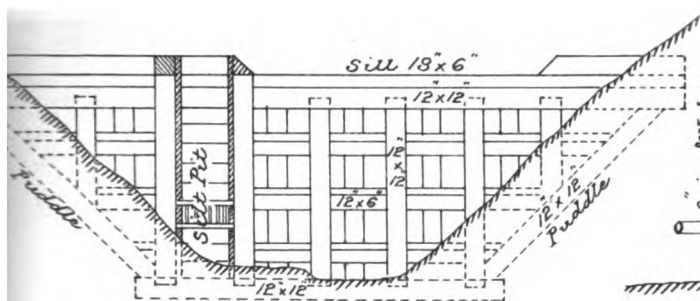
By Authority: JOHN MACKAY, Government Printer, Wellington.—1898.

*Price 6d.]*

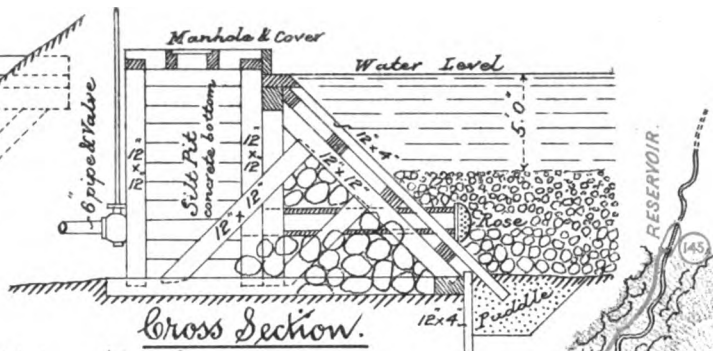


Waterfall





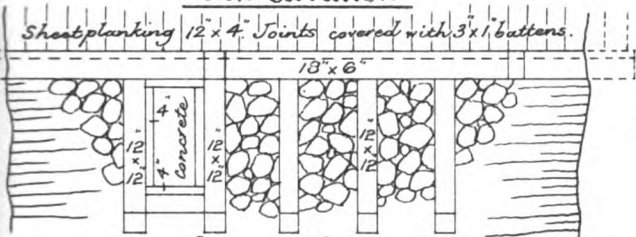
Back Elevation.



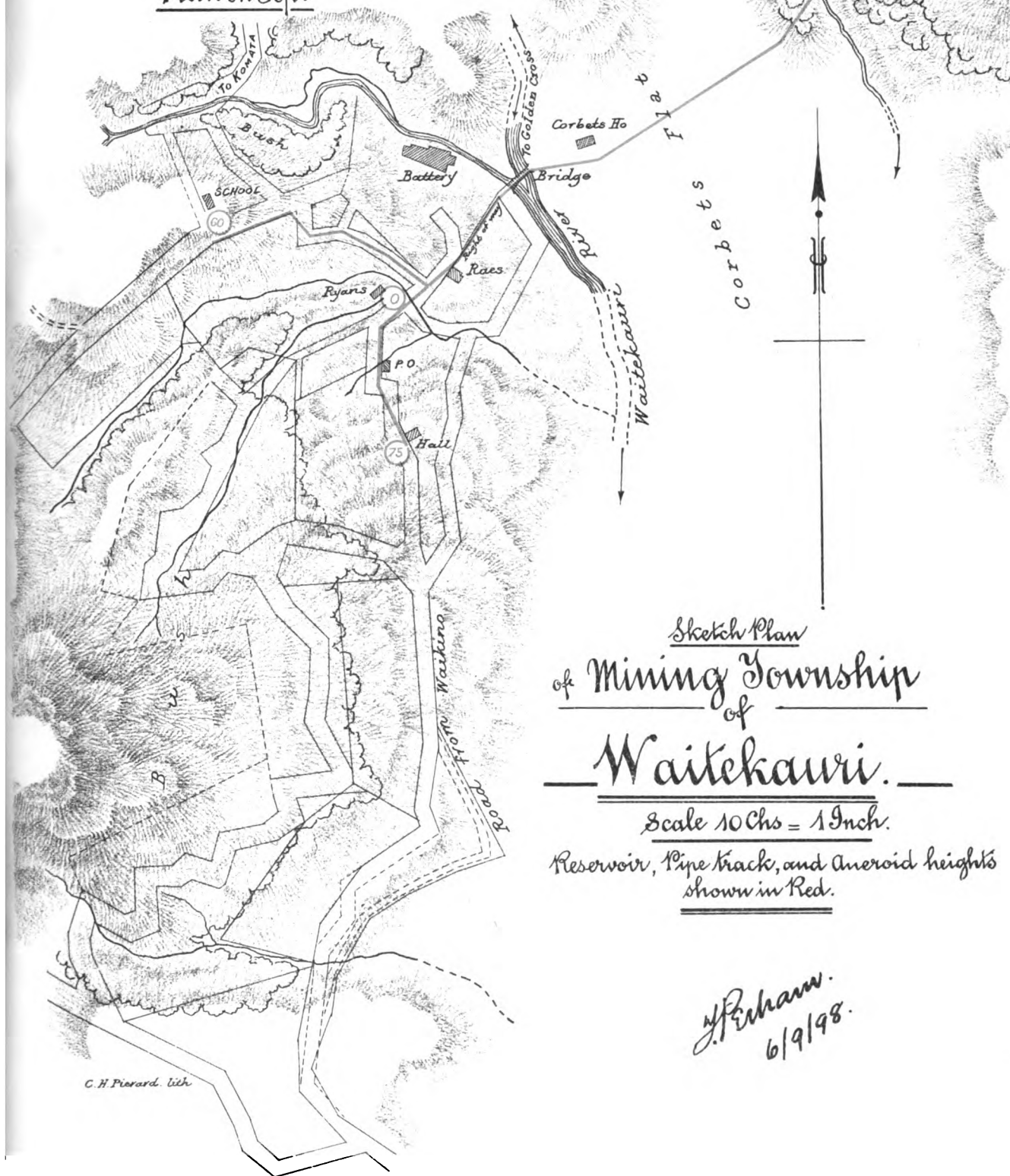
Cross Section.

Yimber Weir.

Scale 10 Feet = One Inch.



Plan on Top.



Sketch Plan  
of Mining Township  
of  
Waitekauri.

Scale 10 Chs = 1 Inch.

Reservoir, Pipe track, and Aneroid heights  
shown in Red.

*y. P. R. Ham.*  
*6/9/98.*





1898.  
NEW ZEALAND.

## WATER-CONSERVATION

(FURTHER REPORTS ON) FOR MINING, IRRIGATION, DOMESTIC, FIRE-EXTINCTION, AND OTHER PURPOSES.

*Presented to both Houses of the General Assembly by Command of His Excellency.*

### MINING TOWNSHIP OF WAIHI.

#### *Domestic Water-supply.*

I now submit my report, together with a sketch-plan of the above township, showing the position of the proposed headworks and pipe-track, with aneroid levels in red; also a sketch of proposed reservoir, and details illustrating scheme recommended.

It may be as well to preface recommendations for a supply of water, both for domestic and fire-extinction purposes, by a brief description of the locality and the somewhat peculiar conditions under which a scheme for a general water-supply must of necessity be formulated. On paper the town is represented as occupying a space of about two square miles, or 1,280 acres. In addition to the business part, which is in Waihi Street, there are numerous dwellings scattered over a large portion of the above area, for the most part on 1-acre sections, and in the vicinity of the batteries and gold-workings, which in the course of events have formed detached outlying centres of population. Being so widely separated from the main centre of reticulation or distribution (which is round and about the corner of Waihi Street and Rosemont Road), to convey water to these outlying tenements for fire-extinction would be almost prohibitive, except at an unwarrantable expense.

Pure water for domestic purposes only, as at the other townships already reported on, is an urgent and vital necessity for the preservation of health at Waihi, especially among the infantile population, and is here provided for in the scheme I am about to describe, and in the general estimate of cost.

Recognising the importance of a pure water-supply, several proposals have from time to time been made to obtain even a temporary supply pending the raising of sufficient funds to carry out a comprehensive permanent scheme; but Waihi, like the townships previously dealt with, is in the unfortunate position, owing to the tenure under which the land is held for business and residential purposes, that the people are debarred from raising loans under the Local Bodies Loans Act. For purposes of this report I examined:—

(1.) The head-waters of the Waitete Stream, but found the water, although permanent, in such small quantity at a sufficient elevation that to obtain any useful pressure this source was not worth entertaining.

(2.) A scheme to convey water from the Waihi Company's race at a point overlooking the chief centre of population, combined with standpipes at convenient points, would no doubt be sufficient for the business part of the town, provided the purity of the water could be assured, and answer the purpose for domestic consumption, but would be of little use for fire-extinction.

(3.) A proposal to tap the Waihi Company's high-pressure main with a 3 in. pipe, and bring water into the town and erect standpipes. This could only be considered of a temporary nature, and, again, would practically be of little use for fire-extinction purposes.

(4.) A scheme to take water from the condenser of the Waihi Company's pumping-station (which it was stated would supply 125 gallons per minute), and also create one or more small storage-reservoirs with filtration-beds. By this means a comparatively pure supply could be laid on, but, as only a comparatively low head could be obtained, it, again, would be of little use for the suppression of fires.

The quality of water from any or, in fact, all of these sources is rendered highly impure, not only by contact with the surface drainage from contiguous huts and other insanitary habitations on the upper bank of the open race, but also through animal contamination. Any of these schemes can, under the circumstances, only be regarded as objectionable and temporary expedients.

After fully considering the different proposals I am of opinion there is no other source from which to obtain a permanent and fairly pure supply of water equal to the Mangatoetoe Stream, which was, I understand, originally reserved for the purpose, and therefore a site for the intake and head-works has been selected about a mile and a half from the corner of Waihi Street and

Rosemont Road, which is about the centre of the business part of the town. The site is at the termination of the Waihi Company's firewood tramway, which nearly follows the stream up from the pumping-station on the round hill to the north-west side of the town, and although it is a favourable site, in so far as it has a good rock foundation for a weir or dam, and holding-capacity for a filter bed, the water is not at present free from impurity and surface-drainage contamination, but it can be made pure by cleansing the creek-bed and filtration.

So great has been the consumption of firewood for use at the battery-kilns that the catchment area is almost denuded of timber; consequently no difficulty should arise in coming to an equitable arrangement for the removal of a temporary stable and woodcutters' huts on the hill above. The clearing-out of log culvert, broken slabs and decayed timber, and *débris* blocking the creek at the proposed site of reservoir will also be necessary.

On goldfield townships, subject to rapid and intermittent fluctuations of prosperity and depression, the populations are generally in a floating condition, but in the case of Waihi the steady and magnificent gold returns from the premier mine warrant anticipation of permanent prosperity for a number of years. From information I have been able to gather the present population may be estimated at somewhere about six hundred to seven hundred, excluding the outlying clusters of tenements before mentioned. As there is a reasonable probability of a considerable increase of population as the mining industry develops, and consequent expansion of the town, it will be advisable to provide for about double the present number, say, fifteen hundred, and upon this figure the scheme and estimate of approximate cost is based.

The Mangatoetoe Stream, at the point of intake, runs at an average (eliminating floods) of about two-thirds of a Government sluice-head, or 359,424 gallons per day of twenty-four hours. This for a population of 1,500 equals 239 gallons per head per day—a most liberal allowance even for four times the population, and ample for all requirements without any provision for storage. The creek, however, is so confined in a narrow and deep rocky gully that to trap the water it is necessary to, at any rate, construct a comparatively high concrete dam. When the creek-bed is thoroughly cleared out a fair-sized reservoir will thus be created, estimated to contain about 300,000 gallons. Making the usual allowance of 30 gallons per head for a population of 1,500, this will provide a supply for 17 days, which will be available in cases of emergency. The proposed head-works consist of a concrete dam (with a rough filter-bed at the back), to be built in the solid rock; a waste weir on the side 16 ft. in width, the sill being 14 ft. above the creek-bed, with a silt-pit in front; and two iron gratings, crossing the creek and its northern branch, to prevent floating snags and rubbish from entering the reservoir. The supply-main from the silt-pit of 6 in. cast-iron pipes will follow down the right bank of the creek, and crossing it in two places on light trestle bridges, in positions as may hereafter be determined as most convenient, to the new valley road as shown on the sketch-plan, thence down the road past the schoolhouse as far as the Waihi Street and Rosemont Road corner. From that point 4 in. pipes will distribute the water about half-way to the bridge on the Karangahake main road to the corner of the block, past the post-office on the Rosemont Road, and up Waihi Street as far as the junction with Gilmour Street. This length of mains, provided with scour-valves, stop-valves, and fire-plugs at suitable distances, is intended to serve the business part of the town with a domestic supply and a means of extinguishing fires. At the Waihi Street and Rosemont Road corner a head of about 140 ft., and at Gilmour Street 120 ft., will be available, the reservoir being at an elevation of 150 ft. above O at bottom of Waihi Street.

Beyond the Gilmour Street corner, and following the Barry Road to about the Martha battery, and from the bottom of Waihi Street to near the Waihi-Silverton battery, with occasional branches along either line where required, 1½ in. galvanised-iron pipes are proposed to be laid for a domestic supply, but not for fire purposes. Laying the water to the houses is not considered in this extension scheme, as I conclude standpipes at convenient distances and localities would best answer the requirements of the scattered houses. On the expansion of the town these 1½ in. pipes can be replaced by 4 in. mains and fire-plugs, &c. Maintenance will cost little, it being only necessary to clear the grids occasionally and scour the bottom of the silt-pit and the mains frequently. The reservoir should be securely fenced from cattle for a distance of at least 2 chains on each side of the creek, and from the dam upstream for 10 chains, and all decayed vegetable matter removed, so as to preserve, as far as possible, the purity of the water.

In the event of this scheme being carried out when permanent levels, &c., are fixed, it may be found capable of some modifications; but in any case I recommend, if the extension scheme for supplying the suburbs is not undertaken, the laying of the pipes to the extent indicated on the plan for domestic fire purposes.

Approximate estimate for whole, £2,725.

26th October, 1898.

T. PERHAM.

## No. 2.

### TOWNSHIP OF TE AROHA.

#### *Domestic Water-supply and Electric Lighting for Domain and Town.*

In accordance with telegraphic instructions "to visit Te Aroha and report on question of water-supply for domestic purposes, the water first being used as motive-power for electric lighting both town and domain," I now forward the result of my examination with preliminary recommendations, and two sketch-plans illustrating the scheme.

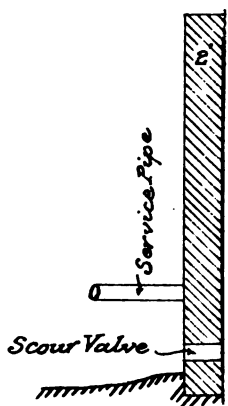
Communicating with Mr. T. Gavin, Chairman of the Domain Board, I found that the Tutamangeo Stream, generally known as "Lipseys" Creek, was the source of supply in favour, on account of its convenient situation and purity of the water, but at the same time doubts were freely expressed as to its volume being sufficient for motive-power or even domestic purposes, except in



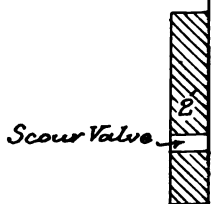




— *Gene*



*S*



*C.H. Pierard. 16*

*Plan of*



flood-time. This information induced an examination of Stony Creek along the Waiorongomai Road, and another much smaller stream running from the deep gully to the south-east of Bald Hill. A suitable site, at an elevation of 230 ft., was found in Stony Creek for a reservoir into which the waters of both or even the three creeks could be collected, but I consider the scheme too expensive for the present requirements of the town.

I next turned my attention to Lipsey's Creek, the sources of which are at the head of a deep and heavily timbered gully to the northward of Bald Hill close to and above the town, and are separated by a narrow, sharp, rocky spur cropping from the gully. The bed in both branches is very steep, rough, and rocky, and the waters in flood-time rapid, but they soon subside after heavy rain. Eliminating floods, the main creek below the forks may be estimated to discharge at a minimum in the driest season about a Government sluice-head, or 374.4 gallons per minute, or 539,136 gallons per day of twenty-four hours.

In combining the electric lighting of the domain and the business portion of the town with a domestic water-supply from this stream it is necessary that the intake should be at a sufficient elevation to obtain the direct pressure for motive-power above the dynamo in connection with a storage-tank or small reservoir, and that point again at a sufficient elevation for a serviceable head for the extinguishment of fires. This can be attained by constructing the intake at the foot of the waterfall in the south branch of the stream at an elevation of 360 ft., and the tank, combined with motive-power house and dynamo, on a convenient small flat about 7 chains lower down the stream at an elevation of 250 ft., thus giving a head for power of 110 ft., with a discharge of 374½ gallons per minute. This is only to be accomplished, however, by joining the waters of the northern branch to the southern by a tunnel, at an elevation of about 600 ft., through the narrow spur, involving only moderate expense and little difficulty.

The sketch on drawing No. 2, attached, illustrates the proposed intake at the foot of the waterfall, which consists of a small but strong concrete dam around the margin of the pool, with a chamber and iron inlet-grating on the left bank of the creek away from the heaviest fall of the water in freshets, the surplus water escaping over the dam or weir. From this chamber the water will be conveyed through a special 8 in. iron pipe to the power-house, and, passing through a Pelton wheel coupled direct on to the shaft of the dynamo, will then flow into the storage-tank immediately below.

Provision is made for cutting off the water from the wheel (which is not required in the day-time) by stop-valves, the water then flowing direct into the tank, and also by means of a by-pass pipe round the outside of the tank for the supply to be kept up in the town during the cleansing of the tank, which from time to time will be necessary, a scour-pipe with valve and overflow-pipe being also provided.

This tank will be necessary in time of protracted drought, and for supplying settled clear water when the creek is in flood, and will contain 60,000 gallons, or one day's supply for a population of two thousand on a basis of 30 gallons per head. From information gathered, the present population is from 1,000 to 1,200, and fluctuates between the summer and winter months, according to the number of visitors to the sanatorium. Therefore for present requirements a supply for 2,000 people is amply sufficient. This leaves a surplus of 479,136 gallons per day for fire or other emergencies.

Taking the domestic water-supply first in order: The delivery-main from the tank to the junction of Whitaker and Kenrick Streets would be 6 in. cast-iron pipes; the reticulation from that point northward along Whitaker Street as far as Burgess Street, and again from the same point south-eastward along Whitaker Street, passing the domain, to the corner of Block XXVII., 4 in. pipes, laid with tees, &c., at localities where in future branches are likely to be wanted. The whole to be provided with stop-valves and fire-plugs at convenient intervals, and scour-valves at the lowest points of the route.

From the 4 in. mains in streets branching off east and west of Whitaker Street, where there are only comparatively few tenements, the system can be extended by means of 1½ in. and 1 in. galvanised-iron pipes as locally required. These small pipes can be laid at little expense, and removed to make way for extension of the 4 in. mains as necessity demands.

The positions of intake, tank, pipe-track, and aneroid levels are shown on drawings.

To a certain extent many of the details at the head-works, and the tank and accessories, only apply to the provision for the electric lighting, and cannot be easily separated therefrom, and consequently add to the cost of the domestic water-supply, which nevertheless can be fairly estimated approximately at about £2,500.

Considering now the lighting of the bath-houses and the domain grounds, I find it will require lights in the aggregate of 1,000-candle power or 40 ampères, made up of 5-candle-power drop-lights in each bathroom, 16-candle-power in the corridors and passages, and 20-candle-power over each entrance-door of bath-houses. In addition to these, lights of 16-candle-power for the office and reading-room, and of 20-candle-power for the paths and grounds and pump-room, will be required.

For the town it is proposed to place eight 20-candle-power lights, at about 5 chains apart, at the corners of the side streets from end to end of Whitaker Street, and one also of 20-candle-power at the front-door of the post- and telegraph-office. This provision will, I think, answer all present requirements both for the domain and the business part of the town.

The motive-power proposed is a 15-H.P. Pelton wheel, coupled direct on the shaft of the dynamo, which is intended to be a continuous current compound wound, 110 volts, and total capacity of 5,000 watts.

An example of the combined machine is given on drawing No. 2.

The cable from the dynamo is intended to run on 20 ft. poles, 1 chain apart, down Kenrick Street to its junction with Whitaker Street; and from thence the wires, running on poles 1 chain apart, will be distributed as shown by the dotted red lines on drawing No. 1.



The approximate cost of the whole installation is estimated at £436, making a total for the combined water-supply and electric lighting of the domain and principal portion of the town, £2,936.

If it is desired to light the domain and baths only, a smaller plant can be driven direct from the 4 in. main opposite the gates of the domain, and the current required and the cost of the electric lighting will be reduced to about one-half, and in that case the waste water from the Pelton wheel or turbine can be used for the swimming-bath.

T. PERHAM, A.M.Inst.C.E.,  
Engineer, Water-Conservation.

The Under-Secretary, Mines Department, Wellington,  
19th October, 1898.

*Approximate Cost of Paper.*—Preparation, not given; printing (2,700 copies), £2 18s. 6d.

By Authority: JOHN MACKAY, Government Printer, Wellington.—1898.

*Price 3d.]*

Drawing No. 1.



Plan

of Te Anau

site of Water power and Dynamo House, Tank,  
 Domestic Supply & Electric Lighting.  
 and Whitaker St.

Chains = One Inch

Reference.

shown thus

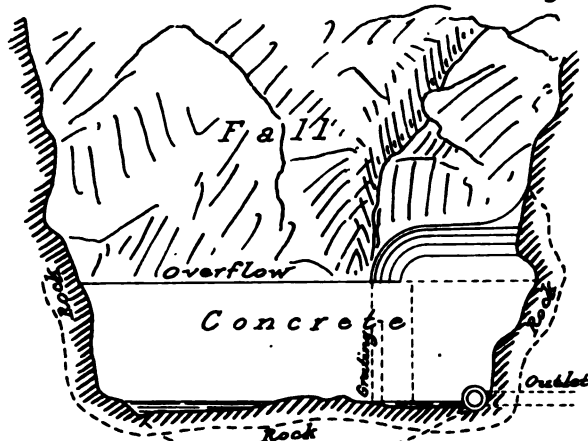
70

"	"	— — — — —
"	"	- - - - -
"	"	■ ○ ■

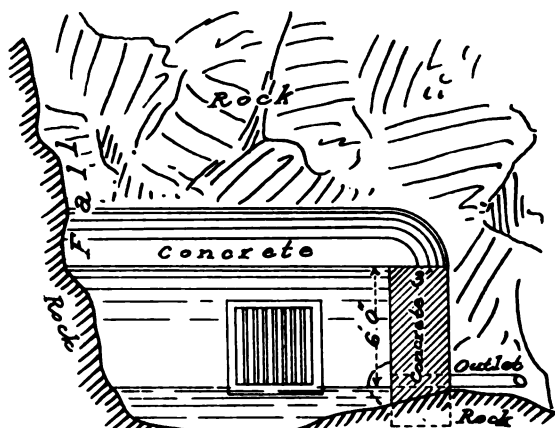
ward. Lich.



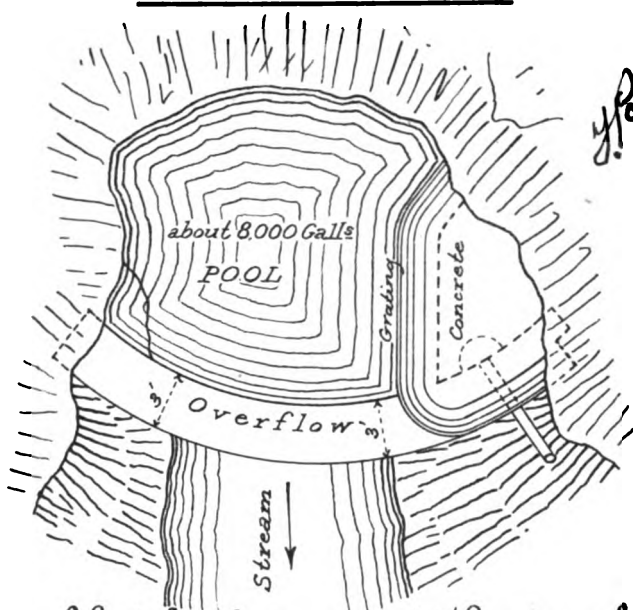
Se Croha Water Supply &c. Details. — Drawing No. 2.



Front Elevation —



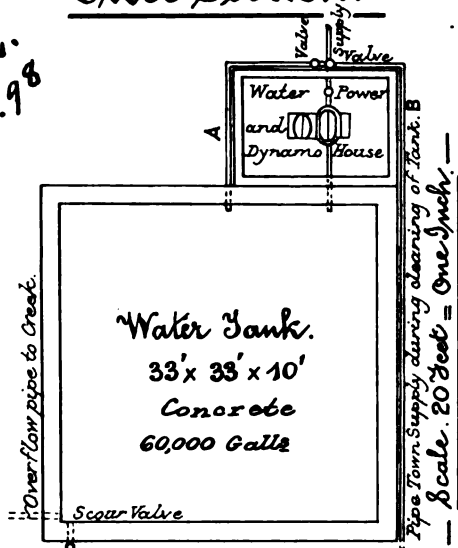
Cross Section. —



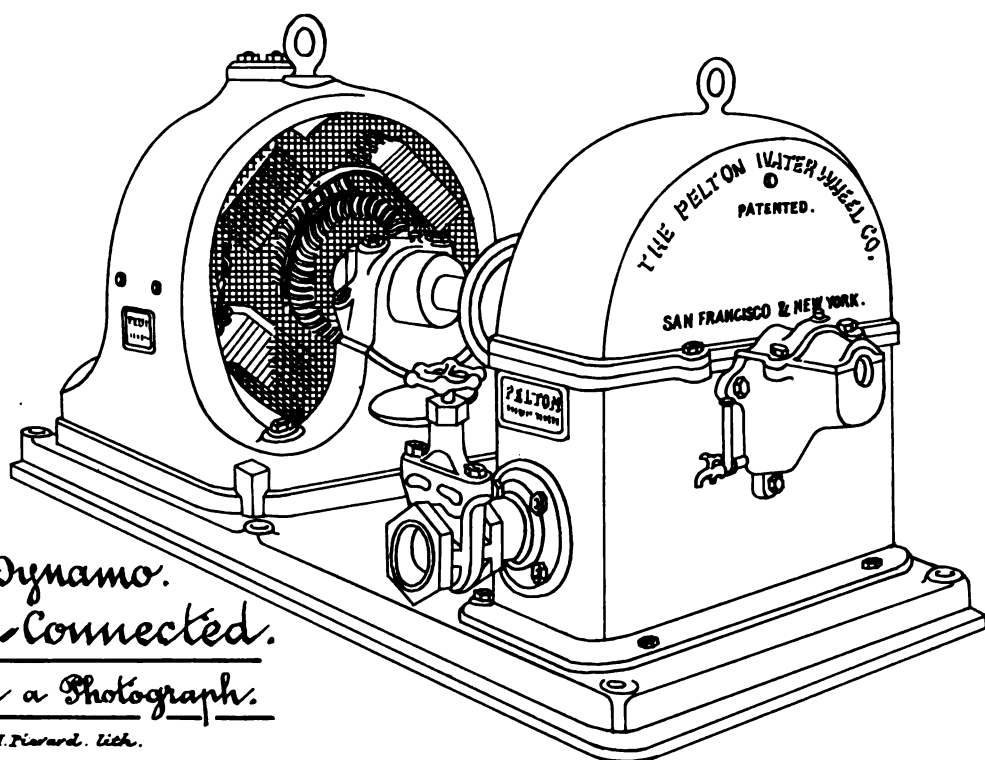
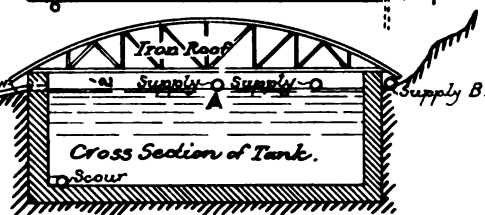
Sketch of proposed Headworks  
at foot of waterfall. —

Scale. 10 Feet = One Inch.

*J. Penham.*  
*15.10.98*



*Scale. 20 Feet = One Inch.*



Motor & Dynamo.  
Direct Connected.

From a Photograph.

*C. H. Pierard. Lick.*



1898.  
NEW ZEALAND.

# GEOLOGICAL EXPLORATIONS

MADE DURING 1897-98.

*Presented to both Houses of the General Assembly by command of His Excellency.*

Mr. ALEXANDER MCKAY, Government Geologist, to the UNDER-SECRETARY for MINES.

SIR,—

2nd June, 1898.

During the year 1897-98 I made in the Middle and North Islands the various examinations specified as under:—

In the Middle Island,—

1. An examination of Kirwan's Hill and the district east of the sources of Boatman's Creek, between Larry's Creek and the source of the north branch of the Inangahua River.

2. The valley of Boatman's Creek and the adjacent hill slopes from the gorge above Capleston to a mile below the township.

In the North Island,—

1. An examination of the copper lodes occurring within the Pupuki watershed, Whangaroa County.

2. An examination of the prospects of finding coal in the hills south of Scoria Flat, Kawakawa, Bay of Islands County.

3. An examination of part of the Mangakirikiri Valley, with reference to the occurrence of mercury-ore (cinnabar) in the Kauaeranga Valley, Thames County.

4. The continuation of the work of the past year with respect to the geology of the Cape Colville Peninsula: Firstly, by an examination of country from the plain west of Karangahake, east-north-east to the coast-line a little north of Waihi; and, secondly, an examination of the Thames Goldfield between Hape and Tararu Creeks. On the first five localities I have the honour to report as fully as the case in each instance seemed to require. With respect to the work done in Ohinemuri and Thames Counties, the necessity of the preparation of rock specimens and slices for microscopical determination, which work cannot be effected for some time, makes it advisable to give a preliminary report, which, in the meantime, will deal with general results, in anticipation of the more detailed descriptions that are to follow.

I have, &c.,

ALEXANDER MCKAY,  
Government Geologist.

The Under-Secretary, Mines Department.

## REPORT ON THE AURIFEROUS ROCKS OF THE WESTERN SLOPES OF THE VICTORIA MOUNTAINS, NELSON.

THE discovery on the northern slopes of Kirwan's Hill of a considerable area over which are strewn a covering of loose blocks of auriferous quartz has led during the past season, 1896-97, to a great amount of prospecting there, in the immediate vicinity and over the surrounding district. The result has been the discovery of numerous reefs of quartz within the area lying between the upper part of Larry's Creek and the upper part of the Waitahu, or north branch of the Inangahua River.

The district is mountainous, most of the reefs being exposed at and somewhat higher than 4,000 ft. above the sea, and forms a flanking range parallel to the Victoria Mountains, but separated therefrom by the deep valley of the Waitahu; while to the north this range is separated from the southern end of the Brunner Mountains by the deep gorge of Larry's Creek.

The auriferous rocks covering the greater part of the area belong to the Maitai series of the New Zealand Geological Survey classification, regarded as belonging to the Carboniferous period.

and are identical with the auriferous rocks of Reefton and the district thence south to Big River; also, with the auriferous rocks of the middle part of Boatman's Creek. The deeper-seated rocks exposed along the gorge of Larry's Creek are mica-schists, resting on granitic gneiss, while to the south-east of Kirwan's Hill there is a development of Cretaceous rocks, comprising coarse breccia, conglomerates, quartz-grits, sandstones, and shales with coal; and these rocks are largely developed to the south and south-west of the auriferous area of Kirwan's Hill.

To the westward the auriferous area of Kirwan's Hill is separated from the better-known area of the middle part of Boatman's Creek by a belt of dark intrusive hornblende rock and an ill-defined area of coal-measures, deeply involved amongst the other older and younger rocks.

Being difficult of access thereto, and surrounded on all sides by non-auriferous rocks, it was not till the season of 1896-97 that any important discovery was made. Mr. Kirwan, the discoverer of the area of loose blocks of auriferous quartz, arriving at his conclusion by experience of what occurs in the Reefton and Rainy Creek districts, regarded the near vicinity of an outlier of the coal formation as a favourable indication for the occurrence of gold-bearing reefs in the slate country, and was thus led to make an examination of the ground in the vicinity of the hill formed of coal-bearing rocks—that furthest towards the source of the Waitahu lies to the south-east of Kirwan's Hill—with the result that on the slope of the hill opposite Coal Hill the field of loose quartz was found, and the discovery of the reefs *in situ* to the west and north was made shortly afterwards.

During the season of 1896-97 little effective work in the way of opening out the different reefs was done, and during the present season, 1897-98, although strenuous efforts have been made to trace the source of the rich gold-bearing boulders of the quartz field, these as yet have been unavailing.

Of the reefs found, none of them as yet afford prospects of gold equal to what are to be obtained from the loose quartz on the northern slopes of Kirwan's Hill. This loose quartz occurs in blocks of all sizes, up to masses 2 to 3 tons in weight, and thickly covers the surface over an area of 10 or 12 chains in length, and an average width of between 4 and 5 chains. The quartz is chiefly, if not wholly, confined to the surface, although masses of the wrecked hill-slope do here and there show portions of reefs held within walls of sandstone and slate rock, identical with the general formation of Kirwan's Hill and the country eastward to Caplestone.\*

Towards the lower end of the quartz-covered area, and where the loose quartz was richest in gold, a tunnel has been driven west into the hill, in the hope that by this means solid ground might be reached, and the lode from which the richer quartz has been derived would thus be discovered. At a distance of 150 ft. from where started this tunnel failed to pass through the broken country, and discontinued during the winter months; work on this was not continued when prospecting commenced towards the end of November last year. It therefore failed in the object for which it was driven, and, what was very remarkable, scarce a fragment of quartz was found in the rubbly material excavated from more than a few feet below the surface.

At the present time, at the opposite or northern end of the field of quartz, a shaft is being sunk to prove the depth to the solid rock, and this shows the same remarkable absence of quartz from all but the surface of the *débris*-covered mountain-slope. This shaft when visited had reached a depth of 35 ft., and had not passed through the broken angular material met with in the tunnel lower down the slope of the hill.

On the north-eastern part of Kirwan's Hill, and in the ridge thence going east and north-east to connect with Trig Hill, there are numerous reefs that strike south-south-east and dip east-north-east at high angles, and thus should pass but a little to the eastward of the field of loose quartz on the southern slope of Kirwan's Hill. It must, however, be noted that in the north and north-west higher part of the hill no notable discovery of quartz has been made (none were reported to me), and westward, along the road leading to the upper part of Boatman's Creek and Caplestone, in the side cuttings of the road, rarely is a piece of quartz to be met with.

All the lodes of quartz found are poor in gold in comparison with the richer of the loose blocks of the quartz-covered surface on Kirwan's Hill, and some there are who refer the source of the gold-bearing stone to a locality at a distance from where they now lie, and consider that the juxtaposition of the reefs *in situ* and the field of loose quartz is merely accidental. After due consideration of this matter I have come to the conclusion that the loose quartz is derived from lodes in the immediate vicinity, and the evidence in support of this conclusion is sufficient.

Wherever the matrix adheres to the quartz, this, as forming part of the foot- or hanging-wall of the original lode, is of the same character as the foot- and hanging-walls of the lodes that have been discovered. The quartz also in character closely agrees with that of the lodes *in situ* that have been discovered, and the correspondence is complete in all except the amount of gold obtainable from the loose and solid stone.

Attempt has been made to explain the presence of the loose quartz on the south-east slope of Kirwan's Hill by supposing that a reef having a low angle of dip occupied practically the surface of the hill-slope, and that by a series of slips this and the foot-wall of the same to an indefinite depth became shattered, leaving the quartz still on the surface of the broken ground.

This supposition of a lode having a low angle of dip stretching across the southern face of Kirwan's Hill is improbable, because of necessity it would have to intersect the southern continuation of the lodes in the near vicinity and the northern part of the field, and, whether dipping to the east, west, or south, the effect would be equal to a sheet of quartz stretched across or through the other reefs. This would reasonably involve the supposition that two systems of fissures filled with

\* Since this was written further prospecting has revealed the existence, more to the north, of a stratum of quartz boulders, overlain by a thickness of ordinary slate and sandstone rubble. This lies to the eastward of the two principal prospecting-drives, and contrasts remarkably with the western area of broken country, over which all the loose quartz was at or near the surface.

auriferous quartz are present, but of this there is no evidence here at Boatman's, nor at Reefton, and I cannot adopt the theory.

It has already been said that all the rock of Kirwan's Hill and the adjacent ranges to the north and north-east are slates and sandstones belonging to the Maitai series, of Carboniferous age, and that outside of this area eastward beyond the Waitahu the rocks of the Victoria Mountains are granitic gneiss, with belts and bands of mica-schist. From the absence of any such rocks amongst the *débris* covering the slope of Kirwan's Hill it is very unlikely that the loose quartz on the southern slope of the hill has been derived from the granitic region to the eastward, nor could the quartz material have come from the westward without being accompanied by granite from the conglomerates at the base of the coal-measures in that direction, and of other different and characteristic rocks lying in that direction.

The rich quartz that is found on the surface of the Lord Brassey Claim has therefore in all probability been derived from a lode not now seen at the surface, and which will most likely be found running along the western boundary of the claim mentioned. More to the westward for a considerable distance there is little indication of the presence of quartz reefs.

The Carboniferous rocks and the lodes which they contain belong to the eastern division of the auriferous rocks stretching along the east side of the Inangahua and Little Grey Valleys from Larry's Creek to Blackwater. This eastern division contains the lodes worked in the vicinity of the sources of Rainy Creek, and thence to Big River, and in some parts are characterized by comparatively thin veins of quartz rich in gold, as on the eastern slope of Merrijigs Hill. The slates and sandstones between the Waitahu and Larry's Creek extend considerably east of the boundary hitherto assigned to this formation, and towards the upper part of Larry's Creek there is a large area over which prospecting might be carried on with a fair show of success.

---

#### REPORT ON THE AURIFEROUS CHARACTER OF BOATMAN'S CREEK, INANGAHUA VALLEY.

SIR,—

Wellington, 31st December, 1898.

In accordance with your instructions dated the 17th December last, in which I was directed to report on the geological features of the valley of Boatman's Creek, between Cronadon and Caplestone, I have made the examinations required, and have the honour to submit the following report relating to the district above referred to:—

##### REPORT.

Boatman's Creek between its main source and where it falls into the Inangahua River drains across a variety of formations, almost all of which have been proved to contain auriferous reefs or deposits of alluvial gold. Its valley, more especially in the middle and upper parts, has been deeply excavated in an auriferous country carrying reefs, while below Caplestone, where the width of the low grounds of the valley is greater, coal-bearing strata and gravels of later date are the only rocks.

Boatman's Creek has been worked for gold from Caplestone upwards to the junction of the two main branches of the principal stream, and Little Boatman's Creek has been worked to its source in Specimen Hill. The amount of alluvial gold that has been obtained from this part of the watershed has been considerable.

At Caplestone the slates and sandstones forming the Maitai series, and which constitute the formation in which lie the auriferous reefs of the district, are overlain by Cretaceo-tertiary rocks, comprising coarse conglomerates, gritty sandstone, and shales with coal-seams. The conglomerates and grits of this series are to some extent gold-bearing, though perhaps to a less degree than are the same beds within the watersheds of the Waitahu and the south branch of the Inangahua. Yet on being cut through and carried away by the action of the creek they must have yielded a considerable amount of gold, that may in part be looked for in the gravels that form the flats of the lower valley. At the lower end of the township the coal-bearing series is followed by heavy deposits of conglomerate and coarse gravels, locally known as "Old-man bottom." These gravels form hills on both sides of the valley to within a short distance of Cronadon, and over a width of from a quarter to half a mile, and to a depth varying from 200 ft. to 400 ft., they have been removed in the formation of the creek valley.

Gold occurs in the lower beds of the "Old-man bottom," and again in a horizon about 60 ft. higher in the series, and further down the valley on Boardman's property at a third and yet higher horizon. The recent alluvial deposits along the valley below Caplestone should therefore contain gold, derived—first, from reefs in the slates and sandstones of the Maitai series; second, from the base of the coal-formation; and, third, from two or three horizons in the "Old-man bottom." And it is only on account of the comparative depth and wet character of the ground to be proved that gold-workings have not been essayed in the lower part of the valley, west of where the coal-bearing rocks disappear under the gravels of the "Old-man bottom."

That much gold has been liberated from the slate-formation the richness of the reefs worked and being worked is evidence sufficient. That gold also has been derived from the lower beds of the coal-bearing series there is also evidence, and yet more so it is clear that large quantities of gold have been liberated from the gravels of the "Old-man bottom" and should now lie along the bed and banks of Boatman's Creek. This may all the more confidently be presumed from the former presence of rich alluvial workings in the parallel streams to the north and to the south in part tributaries of Boatman's Creek. It is true that these streams are not of equal volume and do not cut so far back into the slate country to the east of the coal-bearing rocks, but this would only tend to show that the gravels of the "Old-man bottom" have been the principal source of gold-supply to such creeks as the lower part of Italian Gully and Frying-pan Creek.



The question of the auriferous character of the gravels of the "Old-man bottom" has been dealt with in the report containing the description of the blocks reserved for mining purposes (Mines Reports, 1896, C.-9); and Block LIII., within which is situated the part of Boatman's Creek forming the subject of this report, is described at page 4 of the report in question (*q.v.*)

That portion of the valley of Boatman's Creek which is under consideration has a creek channel of moderate width, in and along which lies a considerable amount of drift timber. The banks are bare of timber, but a few feet from the stream the flats have till recently been covered with bush and stumps and dead timber, the presence of which may to some extent interfere with the working of the flats.

As bearing on the matter of this report might be raised the question, much discussed by miners on the West Coast, as to whether the gravels of the "Old-man bottom" carry appreciable quantities of gold or no. This has been dealt with sufficiently in the introduction to the description of the blocks reserved for mining purposes above cited, and in the reports for the year 1895, for which see Mines Reports, 1895, C.-13, "On the Geology of the South-west Part of Nelson and the Northern Part of the Westland District."

The Under-Secretary for Mines.

ALEXANDER MCKAY,  
Government Geologist.

## REPORT ON THE COPPER DEPOSITS OF OMAUNU No. 2, WHANGAROA COUNTY.

ABOUT the beginning of February, 1898, an examination was made of the copper deposits at Omaunu No. 2, Whangaroa County, on which the presence of copper-ore was first ascertained in 1892.

Copper was first discovered in a small creek, which, from the trig. hill (Maunga-meme) overlooking the lower Kaeo Valley, drains south-west into the Upper Pupuki. The outcrop consists of a series of pyritous boulders forming a bar and rapid in the bed of the stream. Since the discovery a mineral lease of 100 acres has been secured by Messrs. Bell and Houston; and subsequently an endeavour has been made to ascertain the size and direction of the lode, and whether or not other lodes exist on the same property. Other leases have been granted; and at the time when the district was visited prospecting was being carried on on two or more of these, and has resulted in the discovery of at least a second lode of considerable size.

The rocks of the district consist of Palæozoic slates and sandstones, with which serpentines are associated within the area over which the copper-lodes have been found. More to the south-west, in the Upper Pupuki and Kaeo Rivers, diorite intrusions are plentiful, and the whole forms part of a belt of mineralised country that extends from Puhipuhi in the south to the north of Doubtless Bay, Mangonui.

At the point where copper-ore was first discovered on Omaunu Block, in the bed of the creek, some endeavour has been made to ascertain the size and direction of the reef, and the character of the rocks with which it is associated. A shaft was sunk on the east bank of the creek close to the outcrop of the lode as seen in the bed of the creek, but this was beyond the outcrop, and, the dip of the lode being north, the rocks on the foot-wall side of the lode were cut into, and no lode of any kind were met with in a depth of 30 ft. A drive was made in a north-west direction till the line of creek-channel was driven across at a point where ore showed vertically over the drive; but, the drive being nearly in the direction or strike of the lode, this, as far as carried, continued in the foot-wall, and failed to show the presence of ore. The original outcrop in the creek-bed showed as a mass of angular blocks that crossed the creek apparently in a west-north-west direction, or nearly at right angles to its course, and which continued up and down the creek some 10 ft. or 12 ft., and constituted the bed of a miniature rapid thus formed.

The ore at the surface consisted mainly of iron-pyrites, but many of the blocks, on being broken into, showed the presence of yellow copper-ore of good quality, and the sample originally taken and tested at the Colonial Laboratory, Wellington, yielded over 30 per cent. of copper.

To lay bare the outcrop the loose blocks in the creek were removed, and all loose material from the foot-wall side of the lode to where it began to be confined by the hanging-wall, but no attempt was made to trace the ore underfoot where so covered in the direction of its dip. On the west side of the creek a pit was sunk close alongside the outcropping ore, but this again was in the foot-wall of the lode, and was not so disposed as to prove anything respecting the lode itself. On both sides the copper-ore has a tenacious clay of a blue colour, which must be regarded as lying between the walls proper. The lode itself is mullocky, and quartz is almost absent.

The rocks exposed in the shaft and drive, and developed on the foot-wall side of the lode, are sandstones and shales of a type such as characterizes the young Secondary rocks of the district, and are like the rocks of the Pupuki Lower Valley, and calcareous in character. The nature of the hanging-wall outside the "pug band" has not yet been definitely ascertained. On this side there is, and apparently over the pug band of the hanging-wall, a thick band of iron-gossan, which, though completely oxidized, still seems to indicate a massive body of pyritous ore which has yet to be cut into and explored. A pavement of boulders of volcanic rock is met with in the bed and banks of the creek, and for 5 or 6 chains higher up than the outcrop of ore the nature of the rocks cannot be ascertained till some distance away from the creek. Further towards its source the banks of the creek show rocks *in situ*, which, however, are decomposed, and a little higher up, at the waterfall, pass into the serpentine. In these rocks copper-ore again appears, some large blocks occurring in the bed of the creek, and others appear in the right bank (which, however, appears at this place to be slipped ground), while at the foot of the waterfall cliff a considerable block of ore lies wedged in a fissure of a rock at that place. From the few facts that could be observed at and near the waterfall it may be concluded that the direction of the ore band must be nearly east and west,

and, as boulders of ore were reported to occur in a branch of the creek east of the waterfall, the east line across the intervening spurs was followed, and—perhaps but a coincidence—this crossed within a chain of where the ore boulders were met with in the branch creek. This determination had to be accepted, there being no better means possible, short of some time and considerable labour. Following down the branch creek (Frenchman's) to the first-described and more important outcrop with the compass, an endeavour was made to follow from that a west line through the bush to the southern boundary of the claim. This resulted also in the line passing within about 2 chains from where an outcrop of ore is reported on outside the claim. This seemed to confirm the supposition that the lodes strike east and west magnetic; but on returning to the main outcrop the conclusion was arrived at that probably the true bearing is more to the north, as indicated by the direction of the outcrop in the creek-bed and of the gossan outcrop on each bank of the creek. There is reason, therefore, to believe that the true course of the lode is from between west-north-west and north-west to the opposite point in a south-east direction. In the opposite direction the lodes should pass into claim No. 3, east of and adjacent to the Prospectors' and Prospectors' No. 2.

Owing in part to the scattered condition of the vein-stuff and mullocky walls as far as seen, but yet more to the mistake made in sinking and driving in and along the foot-wall rocks, an impression prevails that the ore seen at the surface, and as far as proved at the principal outcrop, is only a slip from a lode *in situ* higher up the creek, which has yet to be discovered. In order to arrive at a conclusion with respect to this matter the prospectors had some further work done while these examinations were being made. A trench north along the bed of the creek was made, and when the ore disappeared underfoot a hole was sunk to prove its presence under the supposed hanging-wall of pug-clay, first at about 1 ft. below the level of the outcrop, and at a further distance at a greater depth of some 2 ft. 6 in. Next it was directed that the trench should be continued in the direction of the dip, and a hole sunk in a position at which some 10 ft. or 12 ft. of rock should be passed through before reaching the upper surface of the ore. So far as at the time could be seen, there is every probability of the ore being in place, while yet it is possible it may not be. Even then, should the latter contingency be the case, the lode *in situ* cannot be far to seek, since it must be somewhere in the distance between the principal outcrop and the waterfall, some 6 chains higher up the creek. I could not estimate correctly the thickness of the ore band, but thought it must be at least 6 ft.

The quality of the ore improved as cover made on the hanging-wall side, but, as poor and high-class ore has been obtained from the very surface, it is a general improvement in the bulk of the ore that is to be looked for and expected. No samples were taken for assay, because sufficient from near the surface had already been taken and reported upon, giving returns up to 34 per cent. of copper, and it is from greater depths that a general average should be obtained.

Since the above was written prospecting has been carried on, which, on the adjacent claim to the eastward, has resulted in the discovery of a heavy lode striking in the direction of the serpentine cliff at the waterfall, and, on the Prospectors' Claim, of a second lode about 90 ft. higher up the creek than the original outcrop. Prospecting at the waterfall has not resulted in the discovery of a solid lode of ore, despite the presence of blocks of copper-ore in the bed and banks of the creek at that place.

It is as yet too early to pronounce an opinion as to the value of the different properties on which copper has been found further than that they are well worthy of being vigorously prospected, and in this connection it may be pointed out that the position of the lodes and facilities for reaching a shipping-place in Whangaroa Harbour are such as to add materially to the value of these properties in comparison with localities where such mines and indications of copper are elsewhere found in New Zealand.

ALEXANDER McKAY,  
Government Geologist.

## REPORT ON FURTHER PROSPECTING FOR COAL AT KAWAKAWA, BAY OF ISLANDS COUNTY.

By ALEXANDER McKAY, F.G.S.

I HAVE the honour to report that, as directed by the Hon. the Minister of Mines, on the 8th and 9th February, 1898, I examined various parts of the Kawakawa Coalfield, with the view of determining the probability of coal being reached by the further prosecution of Boreholes Nos. 1 and 2 in course of being sunk by the Russell Syndicate (Limited).

I readily arrived at the conclusion that there is little likelihood of either the one or the other of the boreholes being within a very considerable distance of the coal horizon; but of the two, No. 1 bore, situated most to the north, and near the border of Scoria Flat, is in all respects the most favourably placed, and the sinking of this might be prosecuted to a successful issue. The coal-measures probably underlie the rocks that as yet have been encountered, these being Pliocene rocks flanking the lower hills on the southern side of Scoria Flat, and developed elsewhere in other parts of the district as strata distinctly unconformable to the coal-bearing series. These not having been passed through the borehole so far as this has been carried proves nothing with respect to the extension of coal westward that has not already been ascertained.

The position of the borehole is nearly in the line of dip of the seam worked at Kawakawa, and in this respect has been judiciously chosen, and without question the underlying coal-measures could be reached and passed through. The evidence, however, is not in favour of a workable seam of coal being found provided the formation was pierced to the Palæozoic rocks on which the coal-measures rest, and the probabilities are that the present company, with limited means at their dis-

posal, would be unable to put down the borehole to the depth required, which would not be less than, and might considerably exceed, 1,000 ft. of boring. But, without taking this fact into consideration, the improbability of finding a workable seam in any case compelled me to advise the discontinuance of the borehole.

There are ample facts contained in the various reports on the geology of the Kawakawa Coal-field showing the improbability of being able to reach coal at depths less than 1,000 ft. at any point to the west of the Waiharakeke Swamp, on the east side of which the deepest borehole put down by the Bay of Islands Coal Company reached to 680 ft. before touching the slate-rock. To the immediate westward of the swamp, owing to the direction and amount of dip of the strata, and the presence of beds yet higher in the series, nothing short of 1,000 ft. of boring would be required to pass through the coal-measures; and as the present borehole, No. 1, is situated fully half a mile further to the west, without having regard of the presence of a younger unconformable formation from the datum line of sea-level, much more than 1,000 ft. of sinking would be required to reach the coal, which in all cases forms the bottom bed of the series, with only a few feet of clay underlying. This is inevitable unless a reversal of the dip takes place, and on the western side of the syncline thus formed, the shorn coal-measures would expose lower and yet lower beds as the section was followed towards the west.

All the evidence collected leads to the conclusion that, as affecting the coal-measures, no such reversal of dip does take place, and that the strata presently being bored in, dipping to the north and north-east, form no part of the coal-bearing series. Yet, allowing that the site of the bore may be on the crown of a denuded anticline, the greenish marly clays passed through must represent the calcareous greensands that are seen on the range further south, and a very great thickness of strata, more than 1,000 ft., would have to be passed through, if the different beds are of normal thickness, before reaching the coal.

Former examinations of a more extended character have shown that west of the Waiharakeke Swamp, on Turntable Hill near Pakaraka, in Morgan's Bush, and wherever the base of the coal-bearing formation can be reached, the evidences of coal occurring as workable seams has always been of a negative character. And, as in the furthest west of the borings made by the Bay of Islands Coal Company the seam was unworkably thin, there is little hope that it thickens to a workable seam at the present No. 1 borehole and again wholly thins out before reaching Turntable Hill.

It is somewhat remarkable that all efforts to find coal at Waiomio and outside the Bay of Islands Coal Company's property have failed, while at the same time there was no mistake as to the identity of the strata tested with the coal-measures of Kawakawa. And, seeking for an explanation of this, as early as 1884 I came to the conclusion that the principal productive part of the field lay to the eastward of Kawakawa, and has since its deposit been almost wholly removed by denudation. Further west and north-west the land-surface preceding the coal-period was too rapidly submerged by the encroachment of the sea, and, therefore, all the beds of the series above the very lowest are marine. This is proved at Kawakawa, where the seam of coal worked was, at many places, directly overlain by a bed of shells of marine species, and, where this was not, a covering of greensand, equally marine, succeeded the coal.

Aware of these discouraging facts, I still thought it was possible to find coal on the western margin of the company's property at Kawakawa, and for some distance up Scoria Flat, and at Waiomio favoured the putting down of a borehole to test the measures there: thinking in the latter case that where a thick seam was absent from the eastern out-crop of the beds that here conditions might be reversed, and that the feeble indications of coal showing on the east margin of the basin might improve as these were followed to the dip westward. The results of the bore put down by the Bay of Islands Coal Company were undecisive, and it yet remains to be seen whether workable coal exists in the upper basin of Waiomio Creek. Coal is reported present in the hills to the westward, but I have not been to the locality nor seen samples of the same.

I have examined the Kawakawa River above Scoria Flat, nearly to its source, and in the several places where coal might be expected none appears. On Turntable Hill, in Morgan's Bush, and at Pakaraka, the evidence is everywhere unfavourable.

To sum up and conclude from the facts above stated, it would appear that there is but little prospect of finding a workable seam of coal within a moderate distance of the Kawakawa workings, either to the west, south-west, or the south, and by a continuance of Borehole No. 1, being put down by the Russell Syndicate (Limited), the finding of coal is a problem of doubtful issue.

As regards Borehole No. 2, the prospects are equally unfavourable, and the evidence to show this, being similar and in great part the same as stated above, need not be repeated here.

---

## REPORT ON THE TE PUKE GOLDFIELD, TAURANGA COUNTY.

By ALEXANDER MCKAY, F.G.S., Government Geologist.

Wellington, 9th June, 1898.

THE country forming the lower grounds between Tauranga Harbour and the main range to the westward from near Captain Stewart's and Hikurangi at first is rhyolite *débris*, from the area of rhyolite of which Hikurangi is the culminating peak.

Further south pumiceous sands and clays form the country along the seaboard back to the mountain-range, composed of andesitic materials; but until reaching about half-way from Katikati to Tauranga the pumiceous matter is not coarser than sand, and gives clear evidence of having been stratified under water—probably an extension of the Bay of Plenty. Three miles south of Katikati

a considerable stream flows from the mountain-range north-east into the Katikati arm of Tauranga Harbour, and the gravels of this divide the stratified pumiceous sands and clays to the north from the larger area of the same rocks that lie to the south. The main range south of Thompson's Track, after forming a massive mountain, descends to lower heights, and to the south and south-east forms hills separated by deep gullies, constituting a country not high, but somewhat broken. The western border of this forms a deep scarp descending to the level of the plain along which flows the Waihou or Thames River. The pumiceous deposits seen along the road from Katikati to Tauranga evidently reach on to this hilly area, and as followed south towards Tauranga become coarser in character, pieces of pumice and fine gravel of pumice being seen in most of the road-cuttings that reach to a moderate depth from the surface. This state of things continues to Tauranga, when andesitic rocks appear on the north side of this part of the harbour, and in the high hill on the east side of the entrance.

To the south-west from Tauranga the country is comparatively low for a considerable distance, and in this direction the pumiceous rocks continue further than was determinable, and divide the block of mountains lying towards Te Puke from the southern continuation of the Cape Colville Peninsula Ranges and the high levels west of the Tauranga-Rotorua Road, which have already been mentioned.

There is thus a complete separation of the two areas of auriferous rock, and the popular idea that the Te Puke Goldfield is connected with, and forms but the southern continuation of, the Hauraki Goldfields is not supported by the facts above stated.

Leaving Tauranga, the stratified pumiceous rocks continue to a distance of six or seven miles on the road to Te Puke, and there give place to brecciated rocks of a dark colour and more distinctly rhyolitic type. These are seen at various points along the road, and, becoming massive developments, form rounded hills of considerable height, and the northern part of the mountainous country that continues to and beyond the Te Puke Goldfield. These rocks form the eastern lower slopes of the mountain-range, and are deeply cut into by the stream surrounding Fleming's Hill to the south and east, and continue in a south direction beyond the limits of the auriferous rocks terminating near Gibraltar Rocks, which (though not visited) are evidently rhyolite.

The rocks containing the auriferous reefs are decomposed andesites, that are not only highly decomposed along the walls of the lodes in Fleming's Hill, but everywhere where openings have been made. Less than a mile to the north the creeks draining from this part show the presence of dark andesites undecomposed, although at the Sisters Claim the rocks forming the banks of the stream are highly decomposed. To the south and south-west there is every appearance of these rocks being cut off by rhyolites within a distance of two miles. To the north the auriferous rocks apparently extend fully three miles, while to the westward they reach the water-divide of the higher range, and descend some distance the western side of the range: how far has not been ascertained.

Reefs of quartz form at least two or three distinct lines in Fleming's Hill, and where opened out show a very considerable thickness of quartz, usually exceeding 20 ft. The quartz is of a light-grey colour generally, but at one place it is dark from the presence of sulphide of iron. Near the surface it has the appearance of having been deposited by the agency of hot water, and in the lower levels of the eastern lode banded spongy and solid grey or creamy quartz is met with in different parts of the same intersection of the lode.

Highly-mineralised stone was only seen at one place on the west side of the hill, and apparently away from the main outcrop on this side of the hill. The stone generally resembles that of the Waihi Mine, Waihi, and, like it, is undoubtedly due to hydro-thermal agencies, but, as on Martha Hill so here, there is no evidence of sinter deposited at the surface. This, if it ever existed, has been removed by denudation, and only the channels filled with quartz, by which such reached the surface, together with the highly decomposed surrounding country, testify to the nature of the action by which the ore-bodies were formed. The curly, twisted, agate-like quartz of the higher levels of the Waihi Mine does not appear abundant on the Te Puke field, and this, on consideration, seems to be the main difference in a mere comparison of the quartz.

As regards the amount of gold present in the stone, the analysis made by the owners is the only source of information. A large number of samples would be required to determine the average yield per ton, and the time at my disposal did not suffice for the making of such a collection of specimens. The returns of samples tested seem to indicate that in different parts the stone varies in value, but is scarcely ever wanting in gold, and it is confidently expected that larger parcels, when treated, will prove the paying character of the ore.

On the Sisters Claim there has not been sufficient work done to prove the size of the lode or the value of the ore; but the indications clearly pointed to the presence of a lode of at least moderate size, and a sample analysed, taken from a lode cut in one of the drives, was reported to us as having afforded what may be considered an excellent return. This, however, does not seem to have been verified by the obtaining and testing of further samples.

I was shown a sample of alluvial gold which was obtained on the slope of the range north of the Sisters Claim. This was in the possession of Mr. Griffiths, of Tauranga. It consisted of a few pieces of coarse nuggety gold, of apparently considerably greater purity than the reef-gold of the neighbourhood, and, from the position pointed out as that from whence it came, it would appear that it cannot be referred to any alluvial deposit covering the low grounds and belonging to the recent period, or from a modern wash in the bed of a mountain creek. It is said to come from a bed of pipeclay exposed in the spur of the range about two miles north of Fleming's Hill, and future examination will be required to determine the true nature of the deposit in which the gold is found.\*

\* Since the above was in type samples have reached Wellington that show the auriferous material to be mainly or wholly volcanic, and partly rounded by action of water.—A. McKAY, 4th October, 1898.

# REPORT ON THE OCCURRENCE OF CINNABAR IN THE KAUAERANGA VALLEY, THAMES COUNTY.

By ALEXANDER MCKAY, F.G.S., Government Geologist.

Wellington, 9th June, 1898.

CINNABAR occurs in the Valley of the Kauaeranga about six miles from where the river enters the Firth of Thames at Shortland. The mercury-ore occurs within the valley of Mangakirikiri Creek, about a mile from where that joins the Kauaeranga, and is more particularly located along the south-west side of Otonui Creek, a tributary of the Mangakirikiri. Mercury-ore, as cinnabar, is found along the hill-slopes on the south-west bank of this creek over a distance east and west of about 6 chains, and from the crest of the ridge, 500 ft., to the level of the creek, which may be some 200 ft. above sea-level. The exact location is about a mile north-west of the Kauaeranga River, and the most westward and highest of the outcrops examined appears near the crest of the ridge at the height indicated, as a series of sinter blocks, so arranged that they appear to dip to the east and indicate the occurrence of a solid lode in the near neighbourhood; but as yet this supposititious lode has not been traced at this, the highest outcrop. Distinct traces of cinnabar are to be found here, both in the quartz blocks and in the country-rock upon which they rest, and to all appearances there is here the outcrop of a band or stratum of highly siliceous country, carrying a percentage of mercury-ore.

Two or three chains to the eastward, and at a slightly lower level, another outcrop of quartz, carrying cinnabar, occurs. This also strikes north and south, and dips to the east at angles varying from  $40^{\circ}$  to  $48^{\circ}$ . The stone is from 3 ft. to 4 ft. in thickness, and at various horizons, principally in the middle of the lode, carries medium to rich ore. Some work has been done at this place to expose the lode along its strike, which shows that both this and the higher outcrop is underlain by a grey rock, consisting mainly of feldspar, corresponding to the "kindly sandstone" of the miner; whilst in both cases the more siliceous deposit is overlain by breccias and tufaceous sandstone that are evidently of younger date.

Descending the slope east towards the Mangakirikiri Creek some 6 chains, a third exposure of quartz-rock carrying cinnabar is seen, which has been exposed at three places sufficiently to show that its extent is considerable. The ore at this place is more generally distributed throughout the stone than at either of the two localities mentioned as occurring higher up the slope of the hill, and from stone which at first sight shows little trace of the presence of cinnabar a fair prospect can be obtained by the rudest method of crushing and panning-off. Passing to the south-east along the middle slope of the hill a continuous exposure of quartz-rock is met with, which at several points shows the presence of cinnabar, and at one place there is a very considerable development of quartz-rock, forming a line of cliffs, which, though not closely examined, seemed likely to carry the ore of mercury, being similar to the outcrop already mentioned.

More to the east, masses of quartz are met with on the slope of the hill, and as loose boulders in the hollow forming the source of a small creek descending to the Mangakirikiri, and here also it was said prospects of cinnabar could be obtained from near the surface and the soil. Finally, near the crest of the ridge, the most easterly of the various prospecting-holes is situated. Here but little work has been done, not more than to prove the presence of the ore, and the quartz-matrix seems to be but feebly developed. Some 12 chains to the westward of this area good prospects of cinnabar, it is reported, can be washed from the soil, and that masses of quartz there occur similar to what appears within the area more particularly prospected and reported on.

Numbers of analyses have been made of the stone at the Thames School of Mines, giving results stated at from 2 to 25 per cent., from the least promising that showed cinnabar to the best that could be found. Some of the samples collected should exceed 25 per cent.; but such rich ore is limited, while, so far as there was opportunity for judging, there is a considerable amount of ore of medium richness. There is warranty for further opening up and developing the property, and as thermal deposits are at or near the surface, the ore-bodies are favourably placed for working.

The cinnabar deposit is likely to be confined to the limits of the property within which it occurs, there being little evidence of the occurrence of similar deposits to the west and south, while more to the north and north-north-west similar quartz deposits, so far as known, contain gold only.

## GEOLOGICAL SURVEY OF CAPE COLVILLE PENINSULA: PROGRESS REPORT FOR THE YEAR 1897-98.

By ALEXANDER MCKAY, F.G.S., Government Geologist.

Wellington, 10th June, 1898.

LAST year a reconnaissance of the whole of the Peninsula was made, and the results of this have already been published.

During the present season work was commenced in the southern part of the field within the Ohinemuri County, and more particularly along a strip of country commencing on the western plain on the road from Paeroa to Te Aroha, and thence continued east-north-east across Karangahake, along the Ohinemuri Gorge to Owharoa and the same line to Waihi and the seaboard on the east coast. Along this line a belt of country about a mile in width was more especially examined, and samples of the different rocks occurring generally and rarer rocks in particular localities were collected always in duplicate, and frequently, where of more than ordinary interest, several specimens were taken.

Beginning at the western end of the belt of country examined, the first rocks met with, forming the lower slopes of the Karangahake Range and the isolated range west of the coach-road from Paeroa to Karangahake, are dark augite andesites belonging to the Beeson's Island group: rocks that by most geologists who have studied the volcanic series of Cape Colville Peninsula are considered as belonging to the latter part of the Miocene Period. With these are often associated coarse angular agglomerate, almost without a finer ash-matrix, and breccias varying from medium to very coarse with ash-matrix. These rocks rise not more than 200 ft. on to the western slope of Karangahake Mountain and the spur therefrom that runs to the northward between the Ohinemuri valley and the western plain.

From beneath the Miocene rocks appear grey trachytic rocks that along the northern part of the belt reach to the crest of the ridge overlooking the Ohinemuri at Karangahake Township, and more to the south rise into and form the western higher spurs of Karangahake Mountain. On the western slope of the spur range and the mountain itself these rocks contain small reefs and leaders of quartz that since the first opening of the Ohinemuri Goldfields have been known to be auriferous, but as yet no successful workings in connection with them have been carried on. Eastward of these, and forming the high spur immediately north-west of the peak of Karangahake, acidic rocks as spherulitic rhyolite are developed, and in these, within the Talisman Extended Claim, are numerous small reefs and leaders of quartz that appear to be the southern extension of the Woodstock lode in the Woodstock United Claim.

This spherulitic rock continues to the north till, in the line of the Ohinemuri Gorge, it is met and overlain by dark augite andesites, the south prolongation of a development of such rocks to the north, or farther down the Ohinemuri Valley. Grey andesites underlie the Acidic rocks and near the surface have for the most part been by solution and leaching deprived of their hornblende minerals. And with these are associated beds of greenish breccia of medium coarseness and ashbeds, and these again are underlain by a great thickness of more or less altered andesite that contains the various reefs within the Woodstock United, Talisman, and Crown Mines. All these rocks appear on the east side of and form the mass of Karangahake Mountain. They belong to the eldest group of volcanic rocks—the Thames-Tokatea group—and east of the Ohinemuri and Waitewheta are arranged so as to dip at high angles to the westward. They are of interest and importance as containing the most valuable group of mines in the Middle and Lower Ohinemuri Valley.

From near the junction of the Waitewheta with the Ohinemuri, and on the west side of the valley, a columnar dyke of dark andesite strikes north along that side of the valley, and as far as the Crown Battery appears along two lines with a rib of greenish breccia rock between, belonging to the Thames-Tokatea group. This dyke, the only one in the Karangahake district, continues along the valley and channel of the river to Docherty's Creek, beyond which it passes through the ridge between the river and Mackaytown, and is not to be distinguished farther to the north.

In the south its columnar structure is very marked, but this beyond the Crown Battery becomes gradually less and less distinct till, where last seen above the ford of the Ohinemuri, this structure has totally disappeared.

Opposite the Crown Battery, on the right bank of the river, the rocks are greenish breccias, such as lie between the two branches of the columnar dyke of dark andesite, and these, though somewhat obscurely, can be traced west to the mouth of the Ohinemuri Gorge at Karangahake. Here a fault of considerable magnitude is present, which, striking south-east, has apparently displaced the country west of it to the south-east.

This fault is not identical with any of those found in the workings of the Woodstock Mine, or in the Crown Mine south of the Waitewheta, but lying to the east of these crosses the higher part of Tukane Hill within the north-eastern parts of those claims.

The Ohinemuri Gorge displays vertical cliffs of brownish decomposed andesite rising 300 ft. to 400 ft. in height on both sides of the gorge. On the north side Butler's Track is cut round the higher part of the cliff on that side, and the various exposures of rock made by road-cutting, both at the high and lower level of the present coach-road through the gorge, gives opportunity for examination of the rocks at various levels and horizons.

The rocks of this part are mainly altered andesites in which decomposition at and near the surface has altered most of the constituent minerals and given to the rocks a grey or rusty-brown colour.

A series of north and south joints traverse the rocks on both sides of the gorge, and at first sight give the impression that they have been tilted to a very high angle, and strike in the direction of the eastern slope of Karangahake Mountains. On Butler's Track it can be seen that the rocks dip to the south-east in the western part of the gorge and to the north-east in the middle higher part and western end of the gorge.

The various workings in the Woodstock Main Lode, or Ravenswood Claim, show the presence of considerable bodies of breccia and coarse ash-rock, and on Butler's Track there is a considerable thickness of crushed andesite again cemented to a solid rock that in cases might be mistaken for a true agglomerate. In the various mine-workings these rocks become greenish-grey in colour, but almost everywhere give evidence of alteration, more especially those parts that are solid lava flows.

These rocks terminate at the eastern end of the deeper part of the Ohinemuri Gorge: on the north side within the Shotover Claim and on the south side of the gorge east of the Ivanhoe Claim.

On account of their great interest as the oldest rocks of the southern goldfields of the peninsula, and their importance as gold-producing rocks, they were followed to the north along the range to the Rahu Saddle, where to the north-west and north-east they are overlain by the younger rocks of the Beeson's Island group.



The numerous reefs of quartz in this Karangahake area of the Thames-Tokatea group trend between north-north-west and north-north-east, and appear to converge to a point within the Hercules Claim towards its north-eastern part, where are three distinct yet closely associated hills showing massive developments of quartz that has evidently accumulated at the surface through the agency of thermal water forming hot springs. The range between the Rahu Saddle gives abundant evidence of quartz accumulated by the same agency, a triple line of such deposits appearing on the northern part of the range, the western of which should correspond with the Woodstock Main Reef on the claim of that name, and the eastern with the Welcome lode in the Crown Mines, the north continuation of which is through the Ivanhoe and Shotover Claims. The thermal and surface character of much of the quartz on the range north of the Ohinemuri Gorge is proved by the presence of plant-remains that occur abundantly in the bedding planes of the quartz rock. The thermal character of the quartz on Karangahake Mountain, in the southern end of this area, is abundantly evident, and as the thermal waters have burst through, altered, and charged with silica the Miocene mudstones of the Rahu Saddle, we have thus an evidence that some of the lodes of the Karangahake district were not formed till towards the close of that period.

About a mile east of Karangahake, and where the deeper part of the Ohinemuri Gorge terminates, the auriferous rocks of Karangahake belonging to the Thames-Tokatea group are overlain by those of the Beeson's Island group. Here the rocks of the younger group consist of breccia conglomerates, associated with massive beds of carbonaceous mudstones, dark or almost black in colour, but weathering light-grey. On the Rahu Saddle these rocks are altered, partly by the agency of hot water and also by a sheet of dark augite andesite that overlies them there. On the banks of the Ohinemuri the mudstones dipping to the eastward are followed by a considerable development of dark augitic andesite lava flows but little altered, followed by a rock of the same nature that has been much altered, with which is associated greenish breccias, and finally by another thick band of dark andesite that terminates the group within 150 yards of the mines at Owcharoa.

So far there have been no quartz-reefs found in these rocks within the Ohinemuri Valley. On approaching the Owcharoa mines they are much decomposed, and finally disappear below the trachytic and rhyolitic group, in which are developed the gold-bearing reefs at that place.

On the ridge of hills between Owcharoa and the Waitewheta, above its gorge, the younger rhyolite formation is prolonged to the westward, so that there is but a narrow strip of the Beeson's Island rocks that there make the connection between the larger areas to the north and the south.

At Owcharoa, in the direct line of section, at the pool in the river, about 100 yards below the main shaft being sunk by the Ohinemuri Syndicate, the decomposed upper part of the Beeson's Island group is followed by a light-grey felspar rock that on weathered surfaces and in the road-cuttings decomposes to a rusty-brown colour. This rock in itself is not decisive of the change that shortly takes place, but is totally unlike any of the rocks that further down the valley are referred to the Beeson's Island group, and agrees well with others yet to be described as part of the acidic rocks of Owcharoa, and which, consisting mainly of crystallized felspar, have to be spoken of as felspar rock. The felspar rock of the pool is followed by a dark—almost black—rock, consisting mainly of hornblende with an abundance of small spherulite. This, again, in the workings of the Radical Mine is followed by grey felspar rocks, with spherulitic structure frequently present. Further to the eastward the section at the surface is not clearly displayed, but the material mined in the sinking of the shaft on the Ohinemuri Syndicate's property and in the driving of the crosscut north-west therefrom is often spherulitic, while on the south-west side of the river, and a little more to the south-east, the rocks are overlain unconformably by a younger group of rhyolite rock that spreads itself widely over the Upper Ohinemuri Plain, and is lodged in a trough-like or V-shaped depression, probably produced by faulting, that runs parallel to the Ohinemuri River to and beyond the source of Waikino Creek, opposite the Victoria Battery.

There has been much speculation as to the nature of the rocks forming the walls of the auriferous reefs at Owcharoa, and on the publication of my last year's report surprise in certain quarters was expressed that I should have considered them as belonging to the acidic group or rhyolite formation. This induced me to make a more than ordinarily careful examination of the locality during the present season, which has fully confirmed my determination of last year.

Spherulitic structure is not known in rocks of the andesic group throughout the peninsula, and, so far as can be gathered, in other countries where such rocks occur, this structure is rarely present, and hence has come to be regarded as a sufficient proof of the higher silicated volcanic rocks. In this respect the proofs are ample that the Owcharoa rocks belong to the acidic group.\* How far they are likely to correspond in time and character with the spherulitic rhyolite found on Karangahake Mountains, a close examination of the specimens collected (which has yet to be made) must show.

Over these Owcharoa rocks come the rhyolites of the vicinity of Waikino and the Upper Ohinemuri Plain. These spread over the lower grounds to and beyond Waihi. A considerable variety of rocks occur in connection with this development of the acidic rocks, but the greater bulk consists of two rocks: First, a brecciated-looking rhyolite, which, however, appears to be the result of irregularity in cooling of the original lava stream; and secondly, overlying this, a grey-earthly cryptocrystalline rhyolite, seldom fluxional in structure, and often porphyritic with crystals of sanidine or blobs and crystals of quartz. These latter rocks sometimes appear as dyke-like masses bursting through the brecciated-looking rhyolite, and both extend to and beyond the Silvertown Hills east of Waihi Township. They also reach up the Waitakauri, to within half a mile of the township; and there, at the base of the group, a stratum of pure pumice is developed.

\* The percentage of silica in these rocks in all samples determined is above 66 per cent.

The auriferous rocks of the Waitekauri, of Martha Hill and the Silverton Hills, in the neighbourhood of Waihi, have been determined as belonging to the Kapanga group of volcanic rocks, and they certainly are quite distinct from the Thames-Tokatea group as developed in the Karangahake area. They more resemble the Beeson's Island group as developed in the southern part of the peninsula, the breccia ash-bed of the two being often very similar. The rocks of Waitekauri and Waihi consist essentially of dark augite andesites, somewhat prone to decomposition, associated with greenish-grey or light-grey breccia and ash-beds. In such rocks occur the Golden Cross Reef, Waitekauri, the Martha and Welcome lodes, Martha Hill, and in these also are situated the workings of the Waihi Grand Junction, Waihi West, Waihi Consols, and Waihi South Claims, in the immediate vicinity of Waihi.

On the Silverton Hills the Waihi Consolidated, Waihi-Silverton, Amaranth, and Union Claims are in the same rocks; and more to the eastward, in the Queen of Waihi Claim, the workings demonstrate the presence of a moderately-fine breccia such as appears in those of the Waihi Grand Junction.

In Martha Hill and over the Silverton Hills the various quartz lodes are clearly deposits in rents and fissures by thermal agency, and although on the Martha Hill there is no trace of sinter-quartz deposited at the surface, there cannot be a doubt but that such once was present. On the south-west part of the Silverton Hills there are great bodies of quartz of a flinty type, which might be regarded as having accumulated at and near the surface, such quartz containing much fossil wood and lesser plant-remains on the Ascot Claim and terrace east of Mackaytown.

As regards the permanence in depth of these lodes, the workings in the Waihi Claim on Martha Hill give every assurance that not only does the quartz live down to considerable depth, but that also the gold contents of the lode are not diminished in the lower part of the lodes.

East and north-east of Waihi and the Silverton Hills, andesitic rock is found in Waihi Monument Hill. On the hills to the north and over the low ground south-west of Waihi Monument and east of Waihi Monument, for about two miles in a south direction, andesite is found on the coast-line. Otherwise the range of hills from which the east and north-east sources of the Ohinemuri drain are almost composed of spherulitic rhyolite, which, clearly younger than the andesitic rocks on which it rests, is yet evidently older than the earthy and fluxion rhyolites of the plain.

The auriferous quartz-lodes of this district, including Karangahake, Owharoa, and Waihi, are productive along a line or belt of country about a mile in width, to the north-east and south-west of which the lodes, if traceable, are not of a payable character. Whatever may be the meaning of this linear arrangement of the gold-mines of Karangahake, Owharoa, and Waihi, the fact is sufficiently remarkable, and remarkably agrees with a similar phenomenon in the Coromandel district in which a belt of productive country, about a mile in width, extends from Coromandel Wharf to the crest and eastern slopes of Tokatea Hill. Similar instances of the projection of auriferous belts of country, or of country carrying auriferous lodes, might be pointed to as occurring in other parts of the peninsula. These will be considered in a further report. Meanwhile, it is remarkable that these belts of auriferous country, in both the cases mentioned, and probably in all the others, run across the strike of the reefs, and where, as at the Thames, the strike of the reefs is north-east, the direction of the auriferous belt is south-south-east.

On the Thames Goldfield, between Tararu and Hape Creeks, the first work was to determine the position of the different rocks and the nature of these, whether as lava-streams, dyke intrusions, or fragmental ejecta.

The lowest rocks in the district are carboniferous slates and grey siliceous mudstones, sometimes regarded as felsite tuff. These rocks form Rocky Point, a little north of Waiohanga Creek, and also appear in the valley of Waiohanga Creek, 250 yards inland from the beach. There are no quartz-reefs in these rocks within the Thames Goldfield, and their chief interest is that as the oldest rocks they form the floor on which the volcanic rocks carrying auriferous quartz-reefs have accumulated.

Over these rocks succeed, towards the south, gritty sandstones, composed largely of grains of felspar, and frequently of small angular pieces of slate, which in character are similar or identical with what is seen underlying the felsite tuff at the north side of Rocky Point. It is very doubtful whether these rocks belong to the volcanic series, and that they are largely composed of broken crystals of felspar does not prove such a connection.

Above the sandstones and slaty breccias there is a grey andesite rock, which on the beach and in the adjacent hills to the mouth of Tararu Creek is succeeded by heavy accumulations of volcanic breccia. These rocks are known as the Tararu Breccias, and their position at the base of the Thames-Tokatea Group has been generally accepted. Sometimes they have been regarded as present in other parts of the field where breccia-bands appear, but of their occurrence in the central part of the Thames field or in Hape Creek there is no proof. The fact is, there are at least five or six heavy bands of coarse breccia-beds belonging to different horizons present on the field, and of these it is the Tararu Breccias that play the least important part.

The section along Tararu Creek shows five of these breccias that strike across the valley and trend through the hills in the direction of the auriferous area at the Thames.

The Tararu Breccias reach up the creek no further than the first crossing of the creek, south-west of which they should pass through Mr. Walker's grounds till obscured by the alluvial deposits forming the shingle-fan or delta of Tararu Creek. The second band of breccia reaches the coast at the north headland of the little bay into which falls Shellback Creek. The third, which is seen in Tararu Creek, at the first crossing above Tinker's Gully, strikes across the valley of Tinker's Gully to the ridge between that and the source of Shellback Creek, and thence passes into the valley of Moanatairi Creek, the lower part of this band crossing from thence into Waiotahi Creek by way of the east slope and higher part of Messenger's Hill. Thence to Una Hill the same breccias and ash-beds run along the east side of the Moanatairi Fault. In Tararu Creek there are yet two other breccia bands—one appearing at the junction of Ohio Creek



with the main stream strikes through the hills across the upper part of Tinker's to the Waiotahi, and is well seen on the new road, then to Punga Flat and Dixon's Hill. This crosses the watershed into that of Karaka Creek and also into that of Hape Creek, where, in the latter case, the breccias begin above the Anchor Claim and extend to near the forks of the creek. Yet another band of fragmental rock lies to the east and north before reaching the Lookout Rocks.

These various bands of fragmentary rocks are separated by four distinct flows of solid andesic rock. The lowest of these is well seen between the first and second crossings, following up Tararu Creek; the second at and higher up the creek than the mouth of Tinker's Gully; the other two at and above the junction of Ohio Creek. Similar flows of andesic rock can be traced in the southern part of the field, notably the cap of dark andesite found on the higher part of Una Hill, and the similar sheet of lava that caps the hill to the eastward. Both these sheets of dark andesite can be traced north across Karaka Creek and south into the Valley of Hape Creek.

The indurated and mineralised zone of the Look-out Rocks closes in an east direction the rocks of the Thames Goldfield; and, looked at as a whole, the arrangement of the rocks between the upper part of Tararu Creek and Hape Creek is a quaquaversal between north-east and south-east, the focus of which would be a little off-shore at Grahamstown.

Within the productive part of the Thames Goldfield proper, along Shellback Creek to Dixon's Hill, runs a nearly east-and-west lode bounding on the north the richer part of the field. At the southern boundary a nearly east-and-west reef runs along the north side of the valley of Hape Creek, and between these run numerous reefs having a general north-north-east to north-east direction, the Hague Smith reef, running a little to the west of north, being the most notable exception to this rule. The general dip of the lodes is to the westward at varying angles, with some exceptions also to this rule.

The field is divided into two very distinct parts by the occurrence of the Moanataiari Fault, which, with a downthrow on its western side, displaces the rocks, an amount which has not yet been definitely determined, but which is very considerable. The presence of this fault renders difficult the correlating of the reefs on each side of it, and any attempts which have been made with this object in view may be regarded as attempts merely.

Of the Collarbone Fault, first described by Mr. James Park, F.G.S., there is some doubt as to whether this affects the rocks to great depth from the surface, or whether it is continued north-east, as described by him, to Punga Flat, and thence into the Tararu Watershed. In the Upper Waiotahi Valley the Golden Age lode is indeed displaced by a fault of considerable magnitude, but there is no clear connection between this and the evidence of faulting between the Moanataiari Fault and the saddle at the head of Collarbone Gully.

The beach slide or fault, which follows the foot of the hill on the east side of Grahamstown and Shortland Flat as yet has not been shown to be a dislocation of the rocks with a downward displacement on the west side, but rather appears to be the result of the sinking of the land having a bold coast-line, and the infilling and natural reclamation of a portion of the submerged area, the line of contact forming the supposed fault.

The shoot of gold on the high levels east of the Moanataiari Fault declines at a low angle towards the south, and regarding the country west of the Moanataiari Fault, and the principal shoot of gold therein as having simply been displaced from this higher level to the eastward the outcrop of the shoot of gold on Kuranui Hill and in Hunt's creek as it is followed to the south declines at a higher angle than on the eastern side of the fault-line, and therefore we may assume that the displacement increases as the fault is followed southward.

During the season 850 full-sized specimens were collected from the rocks *in situ*, or from the tiphead of different mines in cases in which work was not being carried on in the mine.

I have, &c.,

The Under-Secretary, Mines Department, Wellington.

ALEXANDER MCKAY.

*Approximate Cost of Paper.*—Preparation (not given); printing, (2,700 copies), 29 s. 6d.

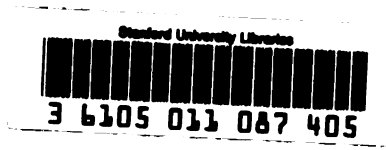
By Authority: JOHN MACKAY, Government Printer, Wellington.—1898.

Price 6d.

838







622.0693  
72 532  
1898

838





